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Historic Background of Modern Vocational Education in the United States—III

Arthur B. Mays *

American Commercial Schools

In North America, schools for the teaching of accounting appeared quite early. Seybolt mentions a number of evening schools teaching this art in the early part of the eighteenth century. He found that, "A Westchester indenture, of July 1, 1716, makes provision for teaching the apprentice to 'Read, Write & Cast Accoumpts to so far as the Rule of three.'" "In some instances the apprentice was to be taught 'to Cypher so as to keep his Own accounts' or 'so far as he be able to keep his Books.'"[25] It seems that in such cases the purpose of instruction in "accounts" was not to train bookkeepers, but only to prepare the apprentices to care for his own accounts when he later became a merchant-craftsman. However, business training played a very important part in many of the colonial evening schools. "In most evening schools of the colonial period writing and arithmetic were taught with special reference to the trades, and commercial pursuits. . . . For many students of this type, the course in writing would emphasize penmanship for clerical purposes."[26] A few of the many announcements of courses found by Seybolt will indicate the prevalence of commercial teaching during the colonial period. He gives the following: James and Samuel Giles, New York City (1759), "Book-Keeping in the True Italian Manner of Double Entry"; N. Walton and W. Hetherington, Philadelphia (1745), "Merchants Accounts in the Italian Manner"; Andrew Lamb, Philadelphia (1755), "Merchants Accoumpts in the True Italian Method of Double Entry, Dr. and Cr."; A. Morton, Philadelphia (1757), "Merchant Accompts according to the true Italian Method of Dr. and Cr. by double Entry"; Peter Donworth, Salem, Mass. (1774), "Book-keeping after the Italian Manner, of double entry"; Robert Leeth, New York City (1752), "Book Keeping after the true Italian Method."[27] There can be no doubt that commercial training involving penmanship, bookkeeping and other phases of business activities was widespread in colonial America.[28] In the early period of the Republic, however, aside from the ever-present informal apprenticeship, it seems that American boys were limited in their opportunity to acquire business training to a few private schools. These schools rapidly increased in number after the first quarter of the century, and their operation became an important business. Chains of schools were organized, and much competition developed among the various concerns operating them. The popularity of the private "business colleges" seems to have reached its crest during the period from about 1850 to 1890. After that time they had to compete with the public schools. The public schools were, at first slow to take an interest in commercial education, but the public demand became so general and urgent that they were forced to establish courses and departments in business training. After 1900, the commercial high school appeared, and since then the development of commercial education in the public schools has been rapid. By 1925 the number of public commercial high schools had increased to twenty with an enrollment of 35,120.[29] Of greater significance, however, is the phenomenal growth of enrollment in commercial courses in the regular public schools. Summarizing the government reports, Marvin shows that the enrollment in these schools increased from 84,412 pupils in 1901 to 278,275 in 1918.[30] A questionnaire study of 75 representative cities made by the same writer, shows that "The percentage of pupils enrolled in commercial work varies from 8 per cent in Indianapolis to 75 per cent reported in Milwaukee. The average percentage for the 21 cities (largest cities) is 34.075 per cent, and the mode 34 per cent."[31] In cities of from 25,000 to 50,000

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[25]Robert Francis Seybolt, The Evening School in Colonial America. Bulletin No. 24, Bureau of Educational Research (Urbana, Ill., University of Illinois, 1925), pp. 21, 22.

[26]Ibid., p. 24.

[27]Ibid., p. 26.

[28]One striking advertisement, given by Seybolt, op. cit., p. 24, offers schooling in "Writing, Vulgar and Decimal Arithmetic; the Extraction of the Roots; Simple and Compound Interest; How to Purchase or Sell Annuities; Leases for Lives, or in Reversion, Freehold Estates, at Simple and Compound Interest," p. 24. Other advertisements of the period indicate clearly that shorthand also was taught. See especially Robert Francis Seybolt, Notes on the Curriculum in Colonial America. Reprint from the Journal of Educational Research (November and December, 1925).

[29]Statistics of Private Commercial and Business Schools. U. S. Bureau of Education (Bulletin No. 4, 1926).

[30]Cloyd Heck Marvin, Commercial Education in Secondary Schools (New York: Henry Holt and Company, 1922), p. 61.

[31]Ibid., p. 68.

population, this study showed from 3 per cent to 60 per cent of high-school pupils were found in commercial courses, the average being 31 per cent. For cities from 10,000 to 25,000 population the average was 29.7 per cent. The United States Bureau of Education reported that in 1924 there were 430,975 commercial pupils in high schools, 18,210 in private high schools and academies, and 188,363 in private business schools. The bulletin points out that "the greatest increase in the number of pupils enrolled in commercial curriculums in the different schools from 1914 to 1924 is in the public schools. The number of these pupils increased from 161,250 in 1914, to 430,975, which is an increase of 167 per cent."[32] The same source shows that "of the 685,100 students (including colleges and universities) preparing for business occupations in 1924, almost two thirds were enrolled in the public high schools."[33]

It seems clear that commercial education of less than college grade very early became a type of school vocational education and that its growth as a school activity has been relatively rapid. It has experienced much less difficulty in its growth in the schools than have the other phases of vocational education, and is now generally recognized as an important aspect of public education. The early demand for school training for commercial pursuits resulted in the organization of many private business schools, long before the people generally were ready to recognize vocational education as a public responsibility. When such recognition finally came, however, the same strong demand for commercial education produced a most remarkable and rapid development of business courses in the public schools.

Homemaking Education

The idea that girls need school training to perform their part in homemaking seems to have been suggested to education in the United States by the arguments advanced for introducing into the schools industrial and agricultural education for boys. Like all important social movements, it had many "beginnings." Dr. Isabel Bevier says: "As early as 1860, Professor Blot gave lessons in cooking in several large eastern cities."[34] She further mentions that "The New York Cooking School in New York City claims to be the starting point in the movement for improving cooking in this country. It had its beginning in 1874 in connection with the Free Training School for Women, with Miss Juliet Carson as Superintendent of this department."[35] Various other private cooking schools were organized in the eastern states during the last quarter of the nineteenth century. During the same period, courses in domestic science were developed in the land-grant colleges of the Middle West. According to Dr. Bevier, "Iowa seems to have been the first to enter this field. The Kansas State Agricultural College began its courses and about the same time Illinois Industrial University (Later, the University of Illinois) organized similar courses."[36] Following its introduction into these colleges, domestic science, as such courses were formerly called, gradually appeared in women's colleges and coeducational institutions of higher learning throughout the country. In the high schools, homemaking courses developed simultaneously with manual training and with the vocational courses offered under the provisions of the Smith-Hughes Act. An exception to this general statement is found in the development of sewing courses, for "The records show that sewing was the form in which household arts was first introduced into the public schools. Needlework was perhaps a relic of the teaching of the dame school and certainly of the convent training."[37] The same source further says, that; ". . . the early records of the Boston schools indicate that sewing was taught as early as 1798, that it was extended to the second and third grades in 1835, and to the fourth grade . . . in 1854."

Practically the same social and economic causes which brought about the introduction of the other phases of vocational education into the secondary schools operated to make the teaching of homemaking sciences and arts a school responsibility. The growth of the courses, which have been variously called "domestic science," "domestic economy," and "home economics," has been rapid in the public schools. The eleventh annual report of the Federal Board for Vocational Education (1927) shows that the enrollment in such courses in schools receiving federal aid has grown from 30,799 in 1918 to 218,406 in 1927. In schools receiving state aid, but no federal aid, the number of pupils in 1927, was 53,992, a total of 272,398 in the two groups of schools. After thousands of years of informal apprenticeship in the home, and a few years of experimental efforts by private schools in the United States to teach the sciences and arts of homemaking, this field of vocational education has seemingly become a thoroughly established phase of American public-school education.

Industrial Education

School training for the trades and industries has a history not unlike that of the other divisions of vocational education of less than college grade. After many centuries of apprenticeship, and after the rise of the factory system, the need for school training for industrial workers arose. In the United States, the early efforts to provide such training resulted almost invariably in some type of a full-time, unit-trade school or evening school, and, as in the case of the other vocational-education fields, the first schools were either private schools conducted for profit, or were privately endowed institutions. The remarkable industrial expansion during the first three decades following the Civil War, caused great concern over the shortage of skilled mechanics, and the lack of adequate means for training industrial workers. The controversies between organized labor and employers over apprentice training, which began during the early years of the century, had almost destroyed organized apprenticeship. It seemed clear to many that the continuance of industrial growth was conditioned by the solving of the problem of trade education. Dr. W. T. Barnard, writing at that time, said: "Skilled labor must be had from some source, and we cannot afford to import it in bulk, if for no other reason than its expensiveness. Our own people have the first claim upon our industrial occupations, but if we are to compete for foreign trade they must be so trained

[32] Commercial Education in 1924–1926. U. S. Bureau of Education, Bulletin No. 4 (1922), p. 2.
[33] Ibid., p. 2.
[34] Isabel Bevier, Home Economics in Education (Philadelphia: J. B. Lippincott Company, 1924), p. 134.
[35] Ibid., p. 135.
[36] Ibid., pp. 120–133.
[37] Bevier, op. cit., p. 141.

as to make and keep them, in knowledge and skill, at least the equals of foreign workmen."[38] A newspaper editorial, anent the graduation of the first class of the trade school established by the Philadelphia Master Builder's Exchange in 1890, stated: "The great want of this age is American mechanics. We are losing each year. Our mechanics, instead of becoming better, are becoming worse. Instead of artists they have been degenerating in attainment of skill and in their mechanical profession. The great mistake is that they do not respect their own calling, and therefore others do not respect them."[39] Another editor writing of the occasion said: "The special need of the country today is educated mechanics; that is, a class of skilled industry that is more than mechanical in its aims and attainments, a class that is artistic in everything pertaining to its calling. We have plenty of men in all trades who imitate the mechanical routine they have learned, but the thorough mastery of our mechanical trades is well-nigh a lost art in the United States, and the result is that foreigners are now very largely filling the more responsible and lucrative mechanical positions."[40] In trying to meet the needs indicated in these quotations, various types of schools were established. European schools and industrial education programs were carefully studied, but the fact that an excellent type of school in Germany would not necessarily be valuable in the United States was understood, and the institutions established during that period usually expressed the individual ideas of their founders. Descriptions of the numerous trade and technical schools started during the 1880's, 1890's and during the decade after 1900, indicate a great variety in offerings, methods, and organizations.

Trade Departments Established

Among the more significant types of schools and classes, were the trade departments established in higher technical schools for both full-time day pupils and for evening students who were engaged in trade work during the day. Evening classes have from early colonial times played an important part in industrial education in this country.[41] Another important group of trade schools was designed for apprentices and conducted by industrial corporations. "It is probable that Hoe and Co., of New York City, the manufacturers of printing presses, were the first of the large corporations to establish a plant school. This school, established in 1872, has been from the beginning a school for apprentices in the skilled trades, chiefly for machinists. Other corporations which established such schools were: the Westinghouse Machine Company in 1888; the General Electric Company and the Baldwin Locomotive Works in 1901; the International Harvester Company in 1903; and at their McCormick plant, in 1907. After 1905 the railroad companies began the establishment of apprentice schools and continued it until the practice became general among them. Among the important corporations, other than those mentioned, having schools in 1920, were: Western Electric Company; Westinghouse Electric and Manufacturing Company; Goodyear Tire and Rubber Company; Ford Motor Company; Packard Motor Company; The Norton Company; Winchester Repeating Arms Company; Mergenthaler Linotype Company; Carnegie Steel Company; National Cash Register Company; Pratt and Whitney Company; Brown and Sharpe Manufacturing Company; Warner and Swasey Company; Yale and Towne Company; Westinghouse Air Brake Company; De la Vergne Company; American Locomotive Company; and R. R. Donnelly and Sons Company. There are many other important corporations maintaining schools but this list indicates the range and importance of the movement."[42]

A third type of schools was the endowed trade school. These schools differed greatly in character; some merely supplemented the daily occupational work of apprentices, and others attempted to train completely for journeymanship.

Endowed Trade Schools

Some of the earlier schools of this type are: The New York Trade School, founded in 1881; The Williamson Free School of Mechanical Trades, founded in 1888; The School of the Philadelphia Builder's Exchange, founded in 1890; The Baron de Hirsch Trade School of Mechanical Arts, founded in 1891; The California School of Mechanical Arts, founded in 1895; The Clara de Hirsch Trade School for Girls, founded in 1899; and the Manhattan Trade School for Girls, founded in 1901. At a later period a number of similar schools were established and after 1907 public trade schools appeared. "New York City established the Boys' Vocational School in 1909, took over the Manhattan Trade School for Girls in 1910, established the Murray Hill Vocational School for Boys in 1914, and the Brooklyn Vocational School for Boys in 1915. The Milwaukee School of Trades, founded in 1906 by the Merchants' and Manufacturers' Association, was taken over by the city in 1907. This school is the first trade school in the United States to be supported by a special municipal tax levied for industrial education. Within a few years, Philadelphia, Portland, Oregon, and Worcester, Mass., established trade schools and Boston, in 1909, took over the Boston Trade School for Girls, which was founded by private agencies, in 1904."[43] During the period of the establishment of trade schools, however, there was a group of educators who were seeking some type of *general* or *basic* industrial training which could be legitimately sponsored by the public schools. The educational thought of the latter half of the nineteenth century precluded the possibility of specific trade instruction as a phase of public education. As a result of this quest, the type of industrial teaching known as "Manual Training" was introduced in 1880 by Dr. Calvin M. Woodward of Washington University, in St. Louis. Dr. Woodward's experiment in the St. Louis Manual Training School resulted in the rapid development of manual training in the public high schools, and later in the public grade schools. It was held that such work developed the mechanical powers of boys in such a manner that they would be able to turn readily to any mechanical trade, when they entered occupational life. From the beginning, however, the general educative values of this type of school activity was stressed, and

[38] Eighth Annual Report of the United States Commissioner of Labor (1892), p. 102.
[39] Ibid., p. 84.
[40] Ibid., p. 84.
[41] See Arthur B. Mays, The Problem of Industrial Education (The Century Co., 1927), Chap. XI.
[42] Ibid., pp. 118, 119.
[43] Ibid., p. 101.

it came, in time, to be regarded as chiefly valuable in the field of general education. Throughout the period of growth of the manual-training movement, efforts were continued to increase the opportunities of specific trade training, and these efforts finally culminated in the passing of the Smith-Hughes Act, in 1917, by Congress, providing for federal aid for vocational education of less than college grade. Gradually the fact was realized that the training of skilled mechanics was not the only, nor even the largest, problem of industrial education. The rapid development of machinery and the continuous expansion of specialization of processes made the training of semiskilled workers increasingly important. As a result of this condition, there arose a demand for public part-time schools and for vestibule schools in the industrial plants. Foreman training also became important as a means of insuring training "on the job" for machine operators and other semiskilled workers.

Newer Developments

Partly as a result of activities fostered under the Smith-Hughes Act, and partly because of the increasing realization of industry that training is necessary for all grades of workers, there has grown up in the United States a most varied offering of opportunities for industrial education. There appear now in the public schools, manual-training courses (better called industrial arts, where the work is rich in technical and industrial information), general continuation schools for juvenile industrial workers, part-time trade-extension classes for young people apprenticed in the skilled trades, evening classes for industrial workers, full-time unit-trade classes for those preparing for the mechanical trades, cooperative part-time programs for the preparation of young industrial workers in both the skilled mechanical trades and the technical occupations in industry, and foremanship courses for the training of foremen in industrial teaching skills. In industry, there are also to be found extensive training programs, such as vestibule schools for the training of semiskilled and unskilled workers, apprentice classes, evening-study classes, upgrading courses of various kinds, and foreman-training classes. All of these types of training activities have been sufficiently tested to know their value and place in a complete program of industrial education, and the chief problem to be solved now is that of coordinating, systematizing, and expanding the numerous efforts being made to train youth for the industrial vocations. The most significant development seems to be the growing tendency to make public educational agencies responsible for industrial education.

The eleventh annual report of the Federal Board for Vocational Education shows that the number of pupils in federally-aided industrial-education classes has grown from 99,338 in 1918, to 495,629 in 1927. In schools state aided but not federally aided, there were in such classes in 1927, 68,559 pupils, making a total of 564,188 in classes receiving either state or federal aid in that year.

Summary

School vocational education is not a new phenomenon. It has existed in some form for many centuries. It is probable that its earliest appearance was for the purpose of training youth for the priestly callings. It seems to have been an accepted tradition to limit school training almost exclusively to these vocations until the beginning of the nineteenth century. Gradually, training for other vocations than the "learned" professions found a place in college curriculums. The modern university offers many opportunities for vocational education and a marked tendency further to increase the number of such opportunities is quite evident. Following the growth of vocational education in the colleges and universities, first the private and later the public secondary schools began making provision for the vocational-training needs for youth. This movement, developing slowly in the earlier years, has experienced a remarkably rapid growth since 1917. In that year Congress passed the Federal Vocational-Education Act, providing federal aid for certain types of vocational education. At the present time certain aspects of agricultural education, commercial education, homemaking education, and industrial education seem to be firmly established as divisions of public education in the United States. There is apparent a very marked tendency to extend the range of vocational-education opportunities in the schools, and increasingly vocational education is regarded as a public responsibility.

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INDUSTRIAL ARTS IN THE SCHOOL

There is need for a wider vision. There appears to be too much of a tendency to establish a shop in the school for the shop's sake, and not for the boy's sake. The purpose of industrial arts is to teach certain important and significant elements in civilization — to represent the industrial and mechanical side of civilization within the school border.—*Lewis Gustafson.*

Trade and Industrial Vocational Teacher Training

H. W. Paine *

VOCATIONAL Teacher Training for the trades and industries as organized at present in the State of Ohio, presents several departures from the usual procedure. Several factors have contributed to the development of this particular state program, two of the most important of which are the large number of vocational and continuation instructors and their wide distribution throughout the state. Their 804 vocational and continuation day and evening teachers distributed in 62 communities offer instruction to 19,741 learners in Ohio, at the present time. The following elements in this program are perhaps the most worthy of study:

1. The teacher-training work is decentralized; i.e., it is handled by three widely separated municipal universities instead of a central state institution.

2. The activities in which the teacher trainers engage cover an extremely wide field including both formal college class instruction and informal work with the teachers on a visitation basis.

3. The report system by which the state supervisor of trades and industries is kept in touch with the work done by the teacher trainers, is unusually thorough, and easy to handle.

4. Provisions for research work in the vocational field are unique.

The decentralization of the work accomplished two long-felt needs in teacher-training work. First, it cuts down the amount of travel necessary for the teacher trainer to reach his outside "centers" or the places where he will hold extension classes for vocational teachers. Second, this decentralization gives *several* institutions and communities a direct share and interest in the success of the program instead of *one* central institution which is often far removed from the actual vocational "front." In Ohio, the work is carried on through vocational departments of three municipal colleges; namely, the University of Cincinnati at Cincinnati, Ohio, with Dr. R. L. Jacobs in charge of the Vocational work for southern Ohio; the University of Akron at Akron, Ohio, with R. J. Greenly directing the work for eastern Ohio; and the University of Toledo at Toledo, Ohio, with H. W. Paine looking after northwestern Ohio. This arrangement gives three major municipal institutions, located in three of Ohio's larger cities, a direct interest in the program. It also cuts down the teacher-training travel very materially.

Each teacher trainer usually holds three late afternoon and evening university classes on the campus each week besides two or three extension evening classes at centers strategically located in his territory. The three campus classes take care of the vocational teachers of the local community and also a so-called "preemployment" group consisting of persons from industry and others who wish to get into vocational teaching work and who, in the opinions of the instructor in charge and of the vocational director in charge of the city's vocational program, are good material for this field. The enrollment in the classes in the outside centers is regulated in a similar manner, it being kept in mind that these are Smith-Hughes classes with specific objectives in training for vocational teachers and those wishing to become such and not designed to be of a general educational character or source of "college credit' for those desiring electives in various fields of scholastic endeavor. Exceptions are made to these rules when campus summer classes are held which are open to superintendents, principals, and others interested. These summer classes are general in character, consisting of courses in vocational and educational guidance, history and philosophy of vocational education, and organization and administration of vocational education. Occasionally these courses are offered during the regular school year, but usually more specific subjects are given in the fall and spring semesters such as: occupational analysis, organization of instruction material, methods of teaching occupational subjects, shop management, observation and practice teaching, philosophy of the general continuation school, determination of teaching content in the general continuation school, and construction of general continuation courses.

The centers are always so chosen that they are most accessible to all the vocational teachers in that territory. For example, a class at Galion, Ohio, under the University of Toledo, is attended by vocational instructors driving in from Mansfield, Marion, Bucyrus, one person from Shelby, and the Galion vocational staff. The philosophy of Mr. E. L. Heusch, supervisor of trades and industries, in charge of the work, is to make the classes as accessible as possible to the widely spread vocational-teaching force. Another point in his philosophy is that vocational teacher training is only in part a formal class-instruction problem and to be most efficient in its functioning, it must include direct service to not only the vocational-teaching staff, but also to local administrators and others.

The vocational teacher trainer in Ohio does his regular formal class teaching and in addition to this, puts in from 40 to 80 hours a month in "informal activities" which vary from discussing the difference in objectives between vocational education and industrial-arts education with school superintendents and principals and visits to local industries with coordinators, to such tasks as the following:

1. Visits to vocational classes with the idea of constructive criticisms in mind.
2. Assisting vocational instructors at school or at their homes in job-sheet construction.
3. Assisting in laying out courses of study.
4. Advising concerning teaching methods.
5. Demonstration teaching.
6. Advising teachers in disciplinary cases.
7. Advising concerning the care and selection of equipment and tools.

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8. Assistance in organizing adequate record systems and progress charts.

9. Assisting teachers in locating suitable display material.

10. Advising teachers concerning current vocational books and material relating to courses of study in other schools.

11. Assisting local administrators in organizing or improving their local vocational program.

12. Addressing local organization in the interests of vocational education.

13. Calling vocational-teacher meetings, usually one or two each semester, for the consideration of topics of special interest to the group, such as (*a*) Construction of related subjects courses for different vocational subjects; (*b*) Objectives of the general continuation school; (*c*) The dedication of a new vocational department or school in the territory.

After studying the above list of informal activities, it is readily seen that the teacher trainer (1) must work in close coordination and accord with the local vocational supervisor or director; (2) that he must base his entire philosophy upon service to the instructor and to the vocational program; (3) that some method must be followed of keeping the state supervisor in touch with his work.

The first two items above are scrupulously followed out by the teacher trainers, and the fact that there have been absolutely no cases of friction between teacher trainers and vocational directors proves that this part of the program is being handled satisfactorily. The last item concerning reports has been solved by what is probably the most interesting and thorough teacher-training report system in the country. Three different blank forms are used besides semester reports of grades made by various teachers enrolled, and a yearly report of formal training work accomplished. Samples of the three most interesting forms are submitted herewith.

Form I covers the semimonthly report to the state supervisor accompanying the expense report. It shows (1) the places visited and dates; (2) Names of persons called upon with their official positions; (3) The purpose of the visit and (4) Agreements, understandings, and conclusions concerning visits made. This report enables the supervisor to maintain a semimonthly check upon the teacher trainer and his activities, and if he feels that the teacher trainer needs advice concerning any situation, this can be given before the item becomes too "cold."

FORM I

Ohio Division,
State Board for Vocational Education
Trades and Industries

Memo —

TO:

RE:

1. Place: Date:

2. Names and Official Positions:

3. Purpose of Visit:

4. Agreements, Understandings, and Conclusions:

Form II is a monthly report covering not only the formal teaching work done by the teacher trainer, but also all his informal activities. In regard to the formal work, the report indicates by suitable symbols opposite the student's name (the key for which is located at the bottom of the page), the term during which the work was taken and whether it was taken for college credit or for state credit only. The student's vocation, date entered, date dropped (if dropped), and sessions attended during the month are indicated in the proper columns. This ends the formal report. The informal report occupies the last four columns which show the

FORM II

Monthly Report -- Trades and Industries -- Teacher Trg.
Division State Board for Voc. Educ., Columbus, Ohio

Name of Course _____ Catalog No. _____

Instructor _____ Center _____ Session* ____ 19 ___

Meeting Place _____ Day _____ Time ___ to ___ No. Sessions ___

Key to Objects

A-Lesson Sheets F-Records
B-Coordination G-Organization
C-Methods H-Class Visits
D-Courses I-Addresses
E-Equipment J-Conference

Names of Students (Alphabetically) (CCr)	Student's Vocation (#)	Date Entered (o)	Date Dropped (o)	Sessions Attended (x)	Date Visited (o)	Time Visited	Hours Spent	Object
1.								
2.								
3.								
4.								
5.								
14.								
15.								
16.								
17.								
18.								

*Fall, Spring, or Summer. (x) Write numerically, thus (4).
(CCr) Indicates course is registered for college credit.
(#) List present vocation only on first report showing date.
(o) Write date thus: 7/8/29 (month, day, year).

Total Hrs. Spent:

Total No. Visits:

date, time, and duration of visit to any teacher, also the object of the visit which is inserted in the *object* column by making use of the key in the upper right-hand corner of the page. For instance, a C in the *object* column would mean that the teacher had been advised concerning methods on that particular visit, while an F indicates that records had been discussed. If both these things had been taken up with the teacher, then both C and F would appear in the *object* column. Activities carried on with vocational teachers or others who are not members of the formal class, are inserted at the bottom of the page under *Special Activities*, but are recorded the same as the work with the regular teachers. The total number of visits and the hours spent are recorded in the lower right-hand corner of the report. This record gives the supervisor at a glance a wealth of detail that is extremely valuable to him in checking the work of the teacher trainer, but on account of the condensed and abbreviated form of the report, the task of making it out is very materially lightened and simplified.

FORM III

Digest of Formal and Informal Teacher-Training Report
Trades and Industries — Ohio
Spring Semester, 1929
(Showing Classification and Distribution of Training)

INFORMAL:	
I. Number of Teacher Visits. *Total*....	180
II. Total Number of Hours of Work (Informal)	194
III. Time Distribution: *Total*	
A—Lesson Sheets.....	43
B—Coordination	8
C—Methods	16
D—Courses	20.5
E—Equipment	3
F—Records	5.5
G—Organization	12.5
H—Class Visits	48.5
I—Addresses	.5
J—Conference	36.5
K—	
L—	
FORMAL:	
I. Vocational teachers employed	45
II. Preemployment group.....	46
III. Not registered for college credit.....	26
IV. Registered for college credit	65
V. Per cent enrolled for college credit...	71
VI. Per cent employed vocational teachers	49
Total enrolled.....	91

In addition to this detailed report, a monthly summary or "digest" as it is called, is submitted (see Form 3). This sheet is self-explanatory and is a brief recapitulation of the detailed formal and informal report giving a little more information concerning the formal enrollment and the distribution of the informal work. These same monthly summary or "digest" blanks are also used in reporting the work of an entire semester. Form III is an actual sample of such a semester "digest" report, detailing the activities of the teacher trainer in northwestern Ohio, for the spring semester of 1929.

In addition to the 180 teacher visits totaling 194 hours of informal work for the semester, it must be kept in mind that the lower part of the report represents additional work of handling six formal university two-hour classes during this period. When one considers that this particular teacher trainer averaged 280 miles of travel per week to reach his extension classes or *outside centers*, it is quite evident that very little time was spent by him in hotel lobbies or in activities of a similar nature. He is made to feel that his responsibility is service to the vocational teacher and his time is accordingly spent in such service.

These reports have been treated in detail because they are not only unique, but the most thorough that will be found in the teacher-training field. They are supplemented by verbal reports and discussions of problems at teacher-trainer conferences called by the supervisor from time to time. At these conferences, new policies are taken up and discussed, as well as the work already under way in the field. For instance, two items developed and agreed to at a recent meeting were a new method of attacking the evening-school trade-instructor problem and the provision for research work for the coming year. The last-named item is probably of more interest at the present time than the former. Much has been said of the need of research work in our vocational field. This is undoubtedly true because any educational effort, especially one so far-reaching as our Smith-Hughes work which is only twelve years old, could profit a great deal by a vast amount of research on such problems as: Selection of students, placement in industry, courses of study for different subjects, available text material for different courses, and hundreds of other items equally important and pressing. The Ohio program in its present organization provides for each vocational teacher trainer using one semester of every third year for research work along some vocational line in which a special need is felt in the state. In other words, the teacher trainer will be freed from class instruction work during that semester to carry on his surveys and other work necessary to his research problem. This should solve the question in a most satisfactory and efficient manner. It is putting men at the work who are not only equipped to handle it and are interested in the problem, but who also have the time to devote to it. Only by such methods shall we ever secure the data necessary to guide our vocational ship wisely and well.

When one considers the short span of time since the passage of the Smith-Hughes Act, the immensity of the program developed and the intricacy of detail devised to handle the various problems arising are indeed a tribute to the executive talent in charge of the work. I respectfully submit this discussion of the Ohio program of "decentralization," formal and informal teacher-training philosophies, report systems, and provisions for research work, as a tribute to the executive and creative ability as well as the vision and perseverance of the state supervisor of trades and industries of Ohio.

INDUSTRIAL-ARTS MAGAZINE

J. J. Metz, Editor

RESOLUTIONS

New Year's resolutions have been made the butt of jokesters for so long, that such resolutions have fallen into disgrace. Nevertheless, the beginning of the year is a good time to cast a backward glance over that which has passed in the twelve months just elapsed, in order to presage from that past, just what the future is apt to bring.

Little or no progress is possible if one cannot learn from that which has occurred and apply the facts thus obtained in arriving at the same or at a different predetermined result.

New Year's resolutions therefore ought not to be as passé as some seem to think. On the contrary, they should hold a very high place in the estimation of anyone and everyone who wants to really advance.

What resolutions then, are to be recommended to the teacher of industrial arts and vocational education, especially to the beginning teacher of these subjects? Of course, the resolutions referred to are those affecting the professional life of these teachers.

First of all, it is in order for every teacher to resolve that his instruction in the coming year will be made as definite, and as understandable as possible.

Second, that his department will be organized so as to cooperate with any other teacher or department in the school as far as this can be done with profit to the student.

Third, that criticisms of the school administration and of fellow teachers will be made constructively to those who are to be affected and not before students or before the general public.

Fourth, that personal professional growth will be made a real issue in the coming year. This may mean further schooling, expansion of one's practical industrial experience, more reading of professional literature, or personal contributions to the literature of one's profession.

Resolutions thus made, cover the entire field of the industrial-arts and vocational-education teacher, touching as they do his activities with his students, with the other school activities, with his fellow teachers, and with his own professional growth.

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HURRY! HURRY!

Waste of life through crime and venture seems to go on. We take great satisfaction from the physical ease of modern living but become callous to the frightful waste of life caused by modern invention.

"Safety first" seems to imply that safety is to be considered at the beginning of the trip, but once well started, we tear along as fast as the old machine will go. We even take pride in the risk of fast travel.

"That machine will go ninety miles without a rattle," says the enthusiastic salesman.

"Show me," says the prospect. He is shown and if no serious accidents mar the first trip, the next trip is devoted to finding *just how much faster* the new bus will go.

Teachers, as such, are not especially interested in this speed mania, yet the boy or girl in school who is attempting to keep up with intra and extracurricular activities is far busier than dad or mother have ever been. Children thrive on activity and we are entirely satisfied that they should be very busy but where all of the child's time is taken up with prescribed schoolwork, there is little opportunity for that "do-as-you-please period" which the normal mind craves and demands.

The class A college undergraduate curriculum is based on a schedule of eighteen hours credit with three hours of application per week to each hour credit or a total of fifty-four hours of work per week. This is nine hours of work for six days of the week and does not include extracurricular interests.

Parents and pupils often take as much or more pride in extracurricular success as on satisfying the requirements of study. All agree that children should take up some of these extra diversions. With this demand on children is it any wonder that they are so exceedingly busy with the prescribed duties of school and home and society that they have no time for individual thought or activity?

It is to be hoped that the development of education will be such as to enable teachers and parents to allow their children a less strenuous and more effective school program.

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ART IN INDUSTRY

Sir Lawrence Weaver, K.B.E., president of the Design and Industries Association of Great Britain, expressed opinions concerning art in industry as he has experienced it in England that should be of great interest to us with our similar problems.

The following quotations are taken from his address at a dinner given in his honor by the American Federation of Arts:

"Art is not a coating that renders tolerable the outside of a thing of utility, but a quality inherent in the thing itself that gives the emphasis of pleasure to its fitness for its purpose."

"The motto of the Design and Industries Association is, Fitness for purpose; that was the basis of beautiful things in traditional days and must be its basis today."

"The craftsman can well give lovely forms to objects of common use and glorify the work of men's hands thereby, but the vast mass of the people must rely on getting beauty by means of the machine. Mass production has come to stay. We must not only accept its limitations, but exploit, in the very interests of beauty, its vast possibilities."

"In order to achieve this, the artist must be put in double harness with the manufacturer."

These statements come to the American with peculiar force when he knows that Sir Lawrence Weaver is a business man and not an artist who might be prejudiced in favor of the interests of beauty.

Some satisfaction is given us by the conclusion that

the American business man is rapidly forced to recognize beauty as a necessary selling quality in industrial products. He has been put in harness with the artist under the need of supplying a fastidious public.

Just how this public has been made so fastidious may be difficult to determine, but it is undoubtedly true that the increased production of modern machinery could not find a market without the demands of a general public which takes great satisfaction from the appearance of its possessions, and buys on appearance as well as from essential need and a satisfactory service rendered.

If anyone doubts the selling value of appearances, note the stress laid on appearances and so-called "style" in advertising.

The first statement quoted is important to the industrial-art teacher who would make art serve industry. "Art is not a coating that renders tolerable (or salable) the outside of a thing of utility, but a quality inherent in the thing itself that gives the emphasis of pleasure to its fitness for its purpose."

ABOUT BIRTHDAYS

With this issue, the INDUSTRIAL-ARTS MAGAZINE is commencing the 17th year of its existence. Its steady growth throughout these years has been largely due to the active interest evinced by its ever-increasing family of readers. Without the help of its many friends it could not have accomplished the things that have been achieved. Because of this continued expression of good will, the editor and publisher of the MAGAZINE feel themselves urged forward by a sense of satisfaction and gratitude toward the giving of better and greater service.

With renewed hope, therefore, we are entering the new year, hoping that it, too, will mark another advance in the growth of the INDUSTRIAL-ARTS MAGAZINE.

A FACTORY GUARANTEE

Laurence Parker, Kansas State Teachers College, Pittsburg, Kansas

"Remember the factory guarantee is for 90 days," said the salesman with the shellac varnish on his hair. We had just signed on the dotted line and agreed to give the dealer what is known as a "convenient monthly payment" in return for the shiny new car on the salesroom floor.

We came down to earth with a bang. "Just what do you mean? You have assured us that this car is mechanically perfect, assembled to run like a watch, etc." "Well," he said, "drop around with it every two weeks or so and let us look it over. It's true that it's the best job we can build but at first things work loose or a part may have a weak spot and we want to get a chance to tighten things up and prevent trouble on the principle of a stitch in time."

It was our first experience with a car and the occasional visits to the service man during the 90 days quieted some fears on our part and stopped rattles and squeaks on the car. Its a fine idea, we thought at that time and we think so yet.

Why not extend the idea of the 90 day guarantee to other lines of manufacture. Take the making of manual-training teachers, for example. Do we turn out what may be called perfect products on graduation day? Isn't there a chance that they are not properly adjusted to go down the road of teaching the boys and girls as smoothly as they should?

It is true that they have had courses in education, courses in benchwork and other kinds of shopwork, courses in methods of teaching, and practice teaching. But somehow practice teaching isn't quite the same thing as the real thing of being on one's own.

We may feel that our output is amply prepared at graduation, but there may be "a part" of our training which won't stand the strain and "snaps" in service. Perhaps then we have a disgusted customer in a superintendent or director. He may even become a knocker of our product. So let's arrange for a factory guarantee of service for our output of manual-training teachers.

We shall have to go to them instead of their coming to us. That is an advantage, for we want to see how they perform in service, how they handle large classes, the first hour and the last hour. We want to be sure they are good housekeepers, good demonstrators, and good supervisors.

Such service as this will improve the working qualities and wearing qualities of the product due to a few quiet words of advice or a heart-to-heart talk which will amount to "a complete overhauling" on occasion. It's only out on the firing line that we really learn to teach and then we long for the critic teacher tucked away on the elm-shaded campus.

Not only this, but our service man can offer suggestions to the factory as well. He will be seeing where we fall down in manufacture. I can imagine him coming in and saying, "Why is it that so many of our products run slovenly looking shops? Do we bear down hard enough on that? What is the matter with the advice given our men on ordering supplies? Superintendents are complaining that lists of tools and supplies are not complete enough for orders. Or he may be able to say, "You surely turn out better finishers than your rival in the field."

Let's put on a factory guarantee. Let's give some of our critic teachers the title of "Service Men" and send them out to service our product. It's true we are turning out the best product we can, but "at first things work loose or a part may have a weak spot and we want a chance to get things tightened up and prevent trouble."

SHOP INSTRUCTION

Instruction must be considered as much as production. The shop is for the boy, not the boy for the shop.—*Southern Workman.*

A boy or girl who does not expect to be a mechanic, is all the better for knowing how to handle common tools—to mend a bench, to make a blackboard, or to construct a set of shelves. The student who can take a regular apprenticeship, or even a partial one, gets most out of the school; and most of the bone and sinew comes up through the shops, with from one to two years in the night school.—*Southern Workman.*

Manual Education in the Elementary School[1]

C. A. Kunou *

IN this article, the term "manual education" is used instead of manual training. The terms, "manual training" and "manual education" should be explained, because this change in nomenclature is more significant than may appear at first sight. The term manual education excludes from its meaning many erroneous assumptions frequently attached to the terms manual training, industrial arts, prevocational training, sloyd, manual arts, home mechanics, etc. Manual education indicates the content and objective in the same way that the terms physical education and visual education indicate kind and objective. Now, while there is only one education, yet education includes various activities and these activities are all governed by the same principle. Each has a specific objective which should contribute to the one general objective of education. The term manual education unfolds these interpretations and opens new visions to supervisors, teachers, pupils, and patrons. It is an American educational term, having no equivalent in any European language which so directly indicates the content and objective of its work. This term was first used and officially adopted by the schools of Los Angeles, so far as is known.

The question of how to properly organize and administer the instruction of manual-education activities in the schools is very important. But, before taking up this part of the subject, it is necessary to consider the assumption that manual-education activities should function as a mere incident in the teaching of industry and other school activities in the elementary schools. What authority, philosophical or legal, is there to warrant such an assumption? Is it generally acknowledged that the function of the elementary schools is to teach industry? In dealing with this phase of manual-education teaching and its organization, it is necessary to review historical developments of the various states and conditions through which the manual-education movement has passed during recent years.

Such a historical synopsis presented here must of necessity be brief. In the year 1890, the State of Connecticut introduced what was then known as "Sloyd" into its normal and model schools. This was the first attempt in the United States to make manual activities function as a subject of instruction in general education and as related to and grouped with other subjects in the elementary schools of a state. This first officially and publicly authorized attempt with manual-education activities was made with the distinctly defined objective that the work was a means of education. From these normal and model schools the movement spread into the elementary schools of the state. The subject of manual education was then taught by regular school teachers especially prepared for this work in the state normal schools of the state. These teachers, besides their regular diplomas, received special diplomas authorizing them to teach manual-education activities in the schools of the state. At that time no one advocated the employment of so-called mechanics as teachers of manual-education activities in the schools, because the work was clearly defined as a means of education and required educated teachers.

Soon after this first official recognition of manual-education activities as means of education, and as possessing intrinsic educational value in the United States, there arose the demand for trade education. This demand coupled itself with the manual-education teaching in the elementary and high schools, and advocated that mechanics and other teachers without pedagogical training should administer instruction for the purpose of teaching trades, or as the statements were then made, "So that the pupils could go out and take jobs as mechanics."

This was the original starting point for what is today known as vocational training. It was also the starting point of the demand for trade teaching. Parallel with this there arose the advocacy for the correlation of manual activities with other school subjects. This, then, is the history of these four stages of manual education. First, its functioning as a means of education and as possessing educational value in itself. Second, its functioning as a factor in the teaching of other school subjects, such as arts and crafts, and to emphasize and illustrate these subjects. Third, the functioning of manual education as a vocational training. Fourth, the functioning of manual education as trade teaching.

It is evident that all subsequent developments of manual-education activities are merely unfoldings of the same original idea, which was educational in character, organization, and function. This is further strengthened by the fact that the vocational-training movement is now reverting to the original educational standards under the name of industrial-arts teaching. By self-division or self-multiplication it separates from Smith-Hughes or trade teaching — which is a natural and proper outcome.

The Sloyd Idea Originated in America

This review of the history of the manual-education movement in the educational system of the United States ought to extend back of the time of the introduction of the sloyd system from which these later developments are traced. This is necessary in order to throw light on some obscure, unknown, and neglected facts, and to establish historic truth about these facts, because knowledge of truth dispels prejudice.

To begin with, the original sloyd idea is not Swedish and did not originate in Sweden. It is American born, having had its inception on the Pacific Coast, in Alaska. While to Sweden and to Dr. Otto Solomon the world is indebted for the working out of the original philosophy and systematic organization of "manual training" as a means of education to function in the services of the modern graded public-school system, yet the

[1]From an address delivered at the A. V. A. convention held in Philadelphia, Pa., December 13, 14, and 15, 1928.

*Supervisor of Manual Education, Los Angeles, California.

historic truth is, that sloyd originated on American soil and is American in origin. This fact seems to have been forgotten or perhaps willfully neglected by many pseudoleaders.

To substantiate this statement, it is necessary only to consult Vol. 12 of European Schools, by L. R. Klemm, International Series, edited by William T. Harris, published by D. Appleton and Company, New York, where, under the heading "The Germ of the Manual Training Idea" on pages 270 to 273, we read:

"The news of the death of Uno Cygnaeus, the noted school reformer of Finland, was hardly noted beyond the confines of his country, yet the name of that man deserves to be remembered in every civilized country. Cygnaeus was the father of that practical instruction in manual training which is now taking its natural course through all civilization, and is recognized as a regular and legitimate branch of study.

"In viewing the life of this man it may be seen that America has contributed its mite toward developing an idea which will prove a salvation to hundreds of thousands, not to mention the benefits its offers to education in general all over the civilized world.

"Cygnaeus was a minister and left his country to follow the call to the then Russian-America (now Alaska) acquired by purchase from Russia (about 1865) by the Lincoln administration. Among the settlements of the extreme northwestern America, Cygnaeus worked as a minister of the Gospel. He brought with him embryonic thoughts on education, and thrown upon his own resources for intellectual company among the people on the coast of the Pacific in Russian America, he began to construe the world's needs in his own way. He was a man of active intellect and fertile imagination. *It was in this wilderness* that the idea of this school reform was *conceived* and *born*. It was a feeble germ and it was nurtured in its infancy by a man who was cut loose from the civilized world.

"Otto Solomon, director of The Swedish Manual Training Seminary says of him: 'Cut loose from the world of culture and thought, surrounded by human beings who were half savages, the young preacher, in his lonely walks from one settlement to another, was seized by an unconquerable desire to benefit the race; to find suitable means of lifting men to a higher level of existence; to discover ways and means of reform in intellectual and moral education. Few books were at his disposal, but among them were Pestalozzi's and Froebel's works. These he studied in his lonely hours, and soon the fructifying spirit of Froebel awakened in him the *germ of that idea* which afterward took that definite shape in which we *know it today*."

Thus is the history of the manual-education idea traced to America. The numerous individual variations in organization, content, and function of the manual-education idea in the educational system, such as vocational and trade teaching, rehabilitating and therapeutic handwork in reformatories and hospitals, and the many phases of elementary handwork in the schools, merely illustrate and prove the universality of the original idea and its applicability in all climes and for all races.

To further show the progress and unfolding of this idea, a few of the definite stages through which it has passed may here be recalled. An educational report from a large European city reviewing the manual-education idea, and speaking of fifty years ago, says:

"At that time the work consisted in the making of repairs and things needed in and about the schoolhouse. Today it consists of definite courses with definite content. But, while these courses are definite they are not fixed, like other institutions, they are modified from time to time and with the unfolding of the right idea."

This is probably the oldest *home* and *community mechanics* teaching on record, so far as its application in city schools is concerned. In their efforts to break away from traditions, to do practical things, and in a businesslike manner, principals and superintendents at one time patterned their schools after the type of the commercial shop. The schools were often conducted on a factory basis, the buildings were of a factory type, the instructors were journeymen mechanics, the students manufactured commercial products and worked eight hours a day the year round. This was the *commercialization* of manual education. Again, untoward urban conditions were to be corrected with manual education and so it became *cityfied*. The agricultural or back-to-the-country movement sought to utilize manual education and its activities and so it was *countryfied*. Then came the correlation propaganda, which sought to hinge manual education with everything, and while its wings trailed in the dust it became *related*. The present state of *study industries* proposes to discover the pupils' latent adaptabilities after a few weeks' treatment with clay, cement, wood, iron, etc. This is the *industrialization* of manual education.

The social service people used manual education as a hobbyhorse and nearly rode it to death. All sorts of repairs and cobblings, all sorts of entertainments, and "Save the boys," and community purposes were acclaimed, and so manual education became *socialized* in accordance with the caprice of individual opinions.

In every case it was a sporting field for educational experimenters. All, however, were efforts to standardize the work and make it fulfill definite functions, and to accomplish definite and measurable results. All these movements have done much to establish the fact that manual education contributes to all good ends when applied as a means of education.

Now, vocational education has been standardized in order to be up-to-date. So manual education to be up-to-date must be standardized. Its practices must be typical of up-to-date work. For example, the dabbling in clay, the building of pottery by the coil method in the fashion of prehistoric man is not typical of up-to-date manual-education work.

There must be methodically arranged courses which promote the growth of the pupils. In other words, the objects to be made must supply what is needed in the educational development of the pupils. It follows that the selection and arrangement of the work on the basis of what is needed in and about the schoolhouse or home is not quite correct, nor can we conceive of manual education as becoming a mere incident in the illustration of other school subjects, because properly arranged manual-training activities must direct the attention of the pupils to the useful and the practical, and be demonstrated in terms of the present. Thus manual education is industrializing and socializing in its influence. It is so not because of the demand for objects in the illustration of other school subjects, or because of the demand for objects in the home, but because it secures the educational interest of those for whom it exists — the children.

Progress has compelled the grouping and systematizing of these various features of manual education so that now the state and federal governments direct and support vocational and trade teaching in order that

these may conform to certain standards, and also that they may produce definite and preconceived results, a thing inevitable in the evolution of all human institutions. In like manner, manual activities in the elementary schools cannot be a blind groping or slipshod conglomeration in an incidental functioning in the teaching of industry and other subjects in the elementary schools, and with instruction administered by teachers not especially prepared to teach. Indeed, manual activities in the elementary schools cannot escape standardization to make them yield definite and measurable results.

Projects, objects, models, or things made in manual-education courses are human institutions. They are mutable and subject to change. The design of a table at present is modernistic, that is, it is loosed from the arts of social orders no longer existing. The designs of models, tables, or projects, today must be expressed in terms of the present so as to interpret the art of the present. The processes of construction also must be typical of scientific processes of the present and be so demonstrated in manual activities, even if only in a miniature way. The advocates for manual-education activities to function as an incident in the teaching of industries and other school subjects in the elementary schools must realize this.

The coming interrelation of manual activities with other subjects in the schools of tomorrow, viewed from an evolutionary standpoint, will be the reverse of what it is now. Academic instruction will be in the service of manual instruction to make intelligent and enlarge the study of things to be made. In other words, it will be related to manual activities to increase constructive efficiency in a generic sense.

In the determination of the character and organization, as well as the function of manual activities in the elementary schools as an incident in the teaching of industry or other subjects, consideration must be given to the scope of such teaching and its limitations. The making of an Eskimo hut in soap, the making of a bridge out of scrap paper will not lead to right understanding of modern construction processes, nor to the establishment of home industry or the profitable occupation of leisure in the home, which are some of the most important missions of manual education at the present time. It is not necessary to elaborate upon the factors leading to this assertion. Manual activities must be of a scientific, artistic, and practical nature. Things must embody salable qualities to justify the processes of habilitating and rehabilitating workers. There is a great demand for such work and such activities. Yet, a reversion to the old days when boys tended to the woodpile and girls cooked on the wood stove is neither desirable nor possible because of a new and more complex social situation which demands interpretation of the same old, yet ever new, saving principle of handwork, in terms of the present. It requires a revelation of new values to the age-old urge or instinct to make things. Have the schools failed to recognize this as an objective of their vocational and manual-education courses? It is with a view of supplying this need that manual education must have trained teachers and somewhat specially organized, yet inexpensive equipment to function in the rehabilitative and redemptive handwork in the schools and in the homes. This is not possible when these activities function merely as an incident in the teaching of other subjects.

Function, Character, and Organization

The function, character, and organization of manual activities in the fourth, fifth, sixth, seventh, and eighth grades of the elementary schools in Los Angeles may be presented as being typical and rational because it is the result of evolutionary stages from the beginning of the manual-training movement in the United States.

Classification of Schools

The Los Angeles city schools are divided into groups, called A, B, C, D, according to the character of the problems in the several schools. The A group represents the foreign, or so-called neighborhood school, because in these schools Americanization activities must be added to the ordinary school activities. The B type means a semineighborhood school; the C type a school of American children, or for the most part of American children. The D school is a rural school in which several grades are of necessity placed in one room.

Schedule for Manual-Education Classes

In order to insure uniformity in the allotment of the special activities in elementary schools, the following schedule is adopted:

In the A and B schools, manual education is given to the boys who attend grades A4 to A8, while in the C schools, it is given in grades B5 to A8.

Children over 10 years of age in B4 or below in A schools may be allowed the special activity, if such pupils can be fitted into regularly organized classes on the schedule.

Time for this subject will be assigned by the supervisor in charge of the activity. Principals are requested to make the best program possible with the time allotted to their schools without asking for special consideration. They are not at liberty to extend the work to other grades than those designated in the schedule except in cases where over-age pupils may work with existing classes. The general understanding is that 90 minutes per week shall be devoted to practical arts.

Time Allotment

Actual time for manual-education class of from 15 to 20 pupils—one lesson per week.

Daily Program for a Manual-Education Room

Number of classes per day — 4
Minimum number of pupils per class — 15

1st Class	2nd Class	3rd Class	4th Class
9:00–10:30	10:45–12:00	1:00–2:00	2:00–3:00
90 minutes	75 minutes	60 minutes	60 minutes

Work in wood constitutes the main feature of the course in elementary manual education. Other activities, such as clay work, plaster-paris work, leather work, reed work, heavy paper and cardboard construction, gilding and compo work, are included in the general plan and incorporated as part of the regular course where teachers are prepared to teach these activities. Where these latter activities are offered they will be given in lieu of a certain portion of the course

in woodwork and not in addition thereto. All the foregoing features of manual-education work are carried on in regular standardized manual-education rooms.

Composite manual-education rooms with additional teacher time have been established at four schools: Avenue Twenty-one, Albion, Avalon, and Brooklyn.

To meet the needs of pupils assigned to development schools, an increased program of manual education activities is carried on.

Specially fitted up rooms for the carrying on of cobbling and advanced leather work taught by specially trained teachers are located in four schools: Amelia, Ann, Avenue Twenty-one, and Nevin.

Regular elementary schools may not organize girls' classes in manual education.

Kite and airplane construction and tournaments and model boat and yacht construction and regattas, at which large numbers of pupils, both boys and girls, come together and display their skill, are annual features of the manual-education scheme.

Occasionally so-called bazaars are held at which childrens' handwork is sold and proceeds applied to some practical or charitable purpose.

This outline shows that some features of the manual work entering in as factors in the general scheme of manual education do not lend themselves readily to exact and analytical outlining. The whole scheme is organized and applied as the conditions of localities may require, in order, as far as possible, to meet the educational demands and needs of the pupils in the various localities. The entire scheme of manual education in the elementary schools is educational in its aim.

Requirements

The minimum average pupil-requirement as conceived in this outline is the amount of work the average pupil in the different grades is capable of doing in a term of twenty weeks with one lesson per week according to time schedule.

Use of Supplies

Supplies for the regular prescribed course are furnished by the board of education according to an adopted schedule of per-capita cost.

Lumber and supplies furnished for work in manual education is used in making the things prescribed in the regular course of study and such other projects as may be approved by the supervisor of manual education and the superintendent in charge. Under no circumstances are these supplies used to make repairs about the building or any other work that should be done by the maintenance department.

Making a Perspective Drawing by Means of Definite Vanishing Points

Frank W. Walsh *

ARTICLE III

IN the last article a simple method of locating vanishing points was described. The present article will show how this method is applied. It is only by application that the principle will be thoroughly understood and remembered. Let us proceed to make a drawing of a large rectangular object, similar to the drawing desk shown in Figure 1.

Seat yourself at a desk or table so that the corner of the object that you are to draw is toward you. Figure 1 shows a student seated in the proper position. You will need a large sheet of drawing paper, a T square, a triangle, a yardstick, four thumb tacks, a couple of brads, and a pencil.

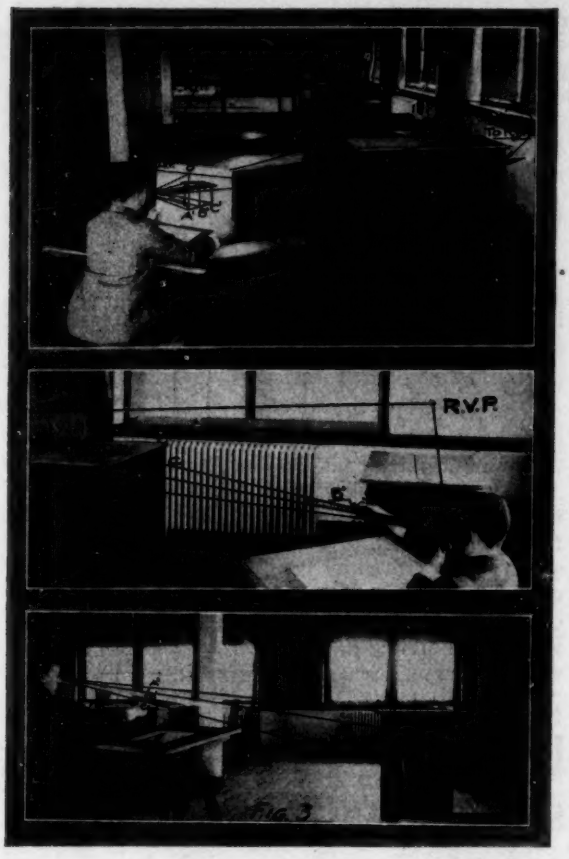
With Figure 1 before you, notice what the student sees, and you will see the same when you observe your object and its surroundings. The student holds his sheet of paper about twenty inches in front of him between his eyes and the desk. If it were possible for him to see through the paper, points A, B, and C would appear on the paper at points A′, B′, and C′. Every point on the desk, if carried toward his eye until they pierced the paper, when properly connected, would give an exact reproduction of the desk. O, the center of vision on his eye level, directly above the top front corner of the desk, is carried toward his eye and pierces the paper at O′. Notice that there is a reproduction of points that appear in the room in a similar way on the paper, while the level of the eye, center of vision, and both vanishing points are shown. The left vanishing point (L.V.P.), which appears on the far wall on the level of the eye of the student, is carried toward his eye until it pierces the plane of the paper, which gives the left vanishing point, L. V. P′. for making the drawing on paper. The right vanishing point, R. V. P′., does not appear in the picture, but R. V. P′. is found in the same way.

Since all points in any picture, in order to be seen, must reach the retina of the eye through the pupil, therefore when those points are projected toward the eye they must all come closer to each other. The area hidden by the piece of paper, when held about 20 inches from the student's eye, represents the full extent of the picture that can be drawn on the paper when in that position.

Now, thumb-tack the drawing paper to your table or desk. You are now going to measure the area that was hidden by the paper when it was held before you, and transfer the measurements to the paper on your desk.

First you must locate the right and left vanishing points which appear in this case on the eye level. In Figure 2 you may see the right vanishing point, R.V.P. A line from R.V.P. shown in Figure 2 runs to the left vanishing point L.V.P., which is shown in Figure 1.

*State Teachers' College, Oshkosh, Wisconsin. (Articles I and II appeared in the June and July, 1929, issues of the INDUSTRIAL-ARTS MAGAZINE.)



This line is on the eye level and O directly above the desk, is the center of vision as shown in both pictures.

Let us now draw a horizontal line near the top of the drawing paper. This line on the paper represents the line on the level of the eye passing through O and extends, as shown in Figure 1, through L.V.P′. and R.V.P′.

Our next problem is to measure the distance from O to L.V.P. and to R.V.P. and transfer the measurements to the paper to locate L.V.P′. and R.V.P′. Hold the end of the yardstick against the cheekbone below the eye which you are going to use for sighting. A small notch cut in the yardstick about 20 inches from the eye gives a good distance from the eye to take proportional measurements and helps to hold the pencil at the same distance each time. Place a pencil, horizontally, across the yardstick in the notch and hold the yardstick so that the pencil is on the eye level and the left end of the pencil directly in line with O. Do not move the pencil, but turn the eye and "spot" a point on the wall directly in line with the right end of the pencil. Swing the yardstick and pencil to the right so that the left end of the pencil is in line with the point that you "spotted" on the wall. Hold the pencil still and turn your eye again so that you can "spot" a second point on the wall in line with the right end of the pencil. Continue this process until you have measured the distance with your pencil proportionally from O to R.V.P.

Select a point O′, somewhere on the line drawn on your paper, approximately, in its center. Now measure the same number of pencil lengths to the right from O′ along the line as you obtained when you measured from O to R.V.P. The point obtained is the right vanishing point, R.V.P.′ that you will use in drawing the desk, also where you should drive a small brad for definiteness. Follow the same process to locate L.V.P′. You should find that it measures from five to seven pencil lengths from L.V.P. to R.V.P. and hence also from L.V.P′. to R.V.P′.

Refer now to Figure 3 and you will notice a student taking height measurements A′ B′ on his pencil corresponds to A B on the desk. Measure in this manner from O down to the top corner of the desk top with the pencil in the notch in the yardstick. Transfer this measurement to your paper by measuring the distance down vertically from O′. With your T square and triangle draw this vertical line on which to measure. You now have the front corner of the desk top located on your paper. From this corner, using your yardstick or a straightedge, draw light lines toward both vanishing points, L.V.P′. and R.V.P. Measure down from this corner to locate any desired height measurements as A′B′C′ from A B C as shown in Figure 3. From points like B or the lower corner of the desk, light lines should be extended toward the vanishing points.

To obtain width measurements as from A to B or from B to C, as in Figures 1 and 2, hold the yardstick lower, as shown in Figure 2. These measurements are all obtained by measuring with the pencil held horizontally and are transferred to the paper with the pencil still held horizontally. A′ B′ and C′ in Figures 1 and 2 are measured, horizontally, from the front corner A, then the T square and triangle are used to carry the lines up, vertically, from the points obtained. All lines on the desk that are parallel to the lines that you have already drawn to the two vanishing points, must run to the corresponding vanishing points. The length and width of the desk top are found by measuring, horizontally, with the pencil and the yardstick and the lines running toward the vanishing points are cut off at these measured lengths. The lines at both ends of the desk run to the same vanishing point, which is also true of the lines of the sides.

Panels or details of the desk or of the object that you are drawing, may be added by measuring them in the same way. The more detail that is added, the more realistic and pleasing is the effect. All of the lines of the desk should now be ruled in so that they are distinct. The background can be filled in around the desk by measuring up or down and to the right or left from O. One detail that will make the desk stand out as if it rested on something is the addition of a floor line. Extend a horizontal line from the outline of the desk for a short distance to the left and another, on a level with it, to the right. This line should be slightly above where the lower back corner of the desk would appear if it were possible for you to see it.

Article IV, which will appear in an early issue of the INDUSTRIAL-ARTS MAGAZINE, gives a short cut for making perspective drawings which has been tried out with students from grades as low as the sixth. A scale is used to make all foreshortened measurements and it is unnecessary to have the object before you to draw it in exact proportion.

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THE INDUSTRIAL-ARTS MAGAZINE,
JANUARY, 1930

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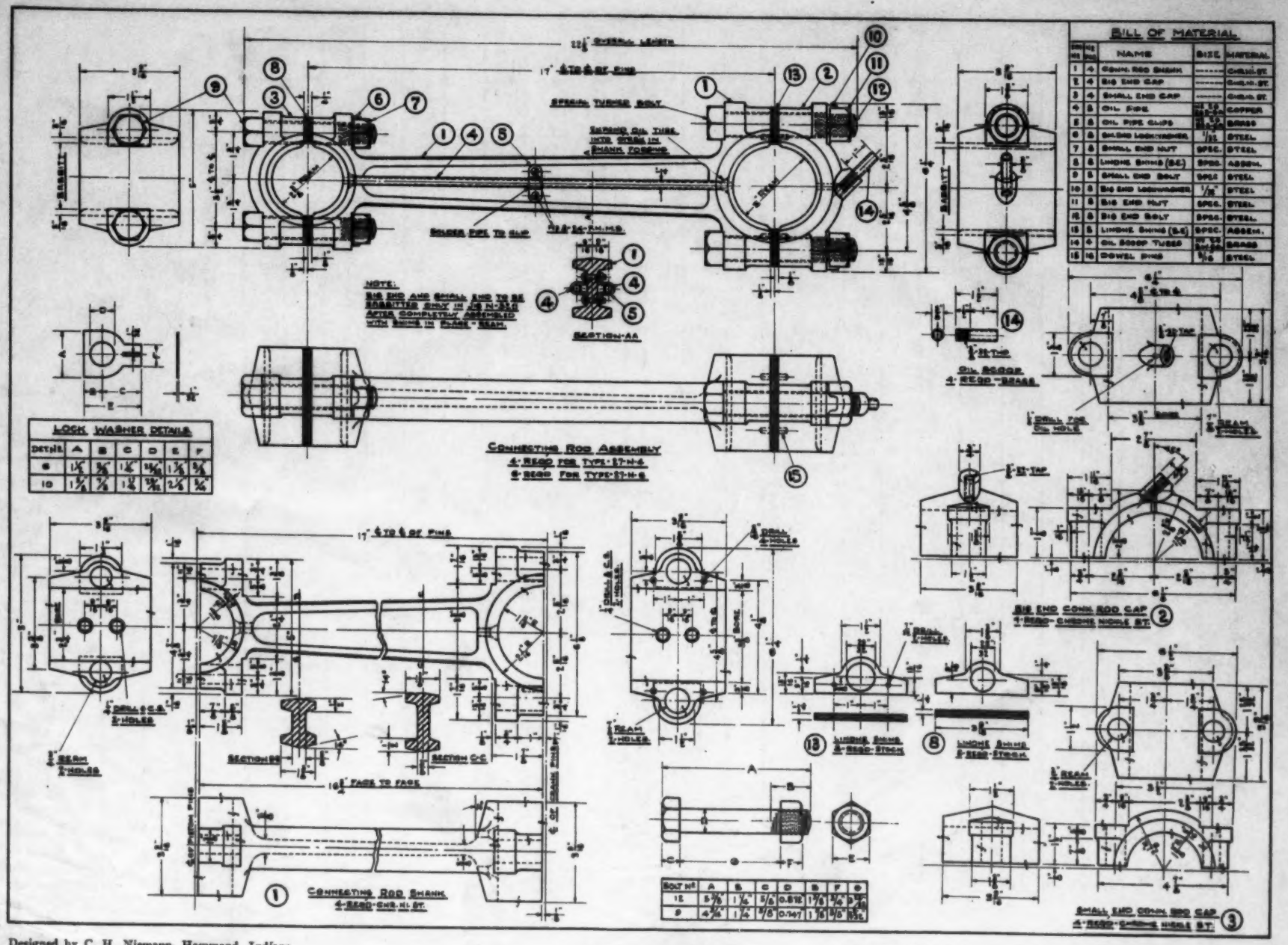

Designed by C. H. Niemann, Hammond, Indiana

For Description See Page 17, Industrial-Arts Magazine, January, 1930.

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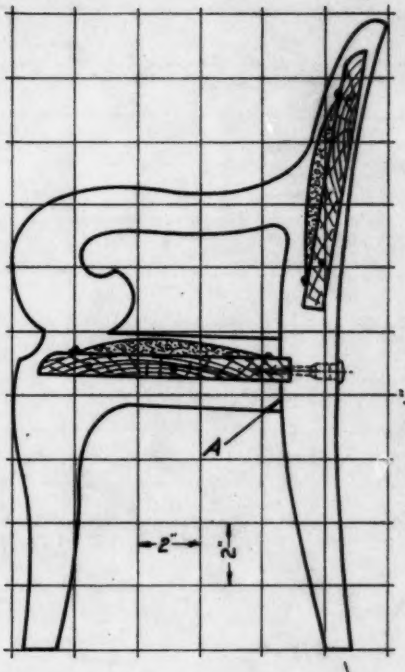
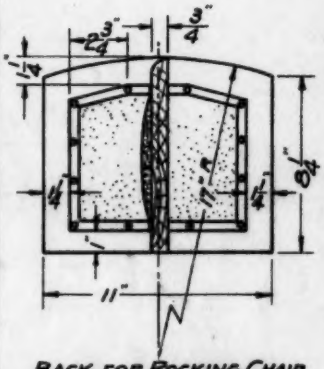
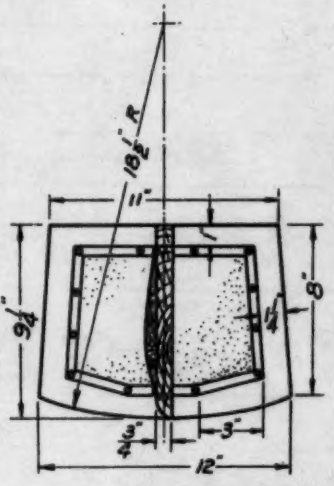
CHILDRENS' PLAYROOM SET

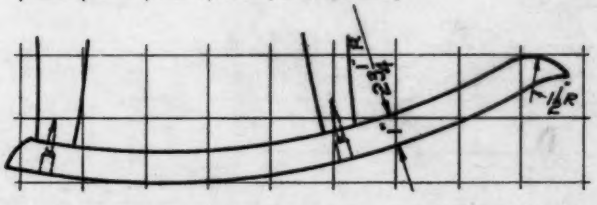


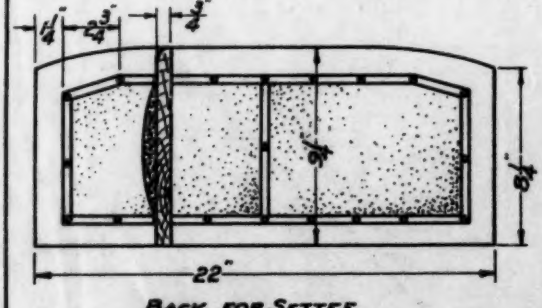


BACK FOR ROCKING CHAIR & STRAIGHT CHAIR

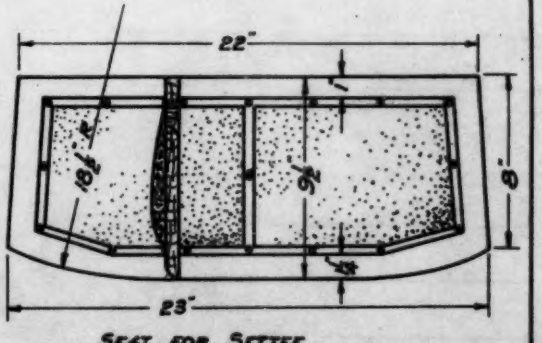


SEAT FOR ROCKING CHAIR & STRAIGHT CHAIR





BACK FOR SETTEE



SEAT FOR SETTEE

D.E. KELLOGG - W.A. DE VETTE

Designed by D. E. Kellogg and W. A. De Vette, Erie, Pa.

For Description See Page 17, Industrial-Arts Magazine, January, 1930.

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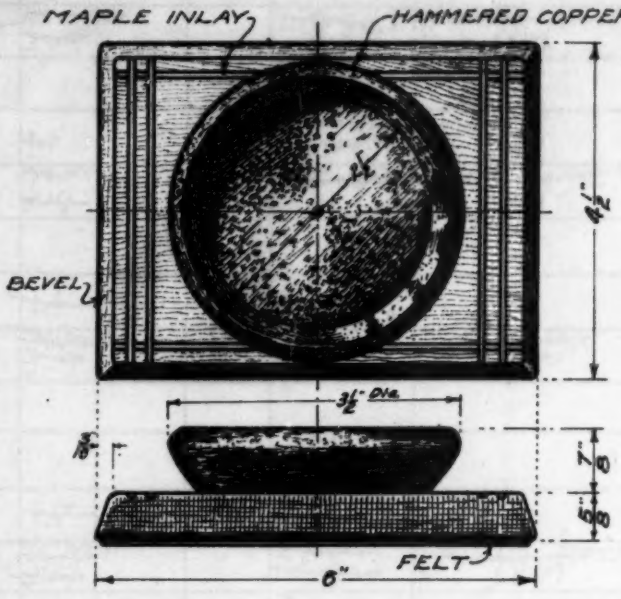
ELE. WOODWORK
CLIFFORD B. SMITH

ASH TRAY

PROJECT INSTRUCTION SHEET – A-1



THE COPPER TRAY IS MADE FROM A 4½" PIECE OF #18 GAUGE MATERIAL.

THE BASE IS A PIECE OF RED GUM WITH A NATURAL FINISH.

RAISING THE TRAY
STRIKE UNIFORM, EVENLY SPACED BLOWS. REPEAT UNTIL TRAY IS THE RIGHT SHAPE.
C

Scale ½" = 1"

THE PROJECT– The more capable boys can make the copper tray as well as the wood base. The slower workers will have to buy theirs.

To make the ash tray, study the following Unit Instruction Sheets:–
W-1, on how to square-up a board;
W-2, on chamfers and bevels;
WT-37, explains how to sandpaper; and
F-1, on how to apply shellac.

MATERIALS– ⅞" red gum wood, maple for inlay, cold liquid glue, felt, #18 gauge copper, white shellac, wax.

TOOLS– Jack and block planes, try-square, marking gage, #1 and #00 sandpaper, hand drill, 5/32" drill, knife, wing dividers, snips, maple block, ball peen hammer, furnace, tee-stake, pencil gage.

DIRECTIONS– 1– Print the bill of material on your working drawing.

2– You will be furnished with a piece of gum wood slightly larger than it will be when finished. Study Sheet W-1. Then square-up the gum wood to its correct size, ⅝" x 4½" x 6", following each step exactly.

3– Study Sheet W-2 so that you know the difference between a bevel and a chamfer. The bevel on our piece of gum wood is ⅛". Set the pencil gage at this amount, (the point must be sharp) and gauge the lines for the bevel. Hold the gage as shown in the sketch at A. Plane the end bevels first.

–A–

4– Hand your wood to the instructor for checking and if correct he will saw the grooves for the side inlay strips.

5– Glue in the side inlay strips.

6– Have the end grooves cut for the inlay and glue the maple in place.

7– Plane this inlay side smooth and then read Sheet WT-37 on sandpapering. When you know how it should be done, sand the gum wood carefully with the grain, using #1 and finally #00 paper. Round all of the arrises slightly.

8– Sheet F-1 explains how to use shellac. Apply one coat, except on the bottom. Allow this to dry overnight.

9– Tear some #00 paper into small pieces. Carefully sand the shellac, as shown at B; with the fingertips only, pressing on the paper. Keep off the arrises and do not sand thru the shellac.

10– Apply a second coat and repeat the sanding. If you have obtained a dead smooth surface on the shellac, apply a coat of yellow wax, very thin. Polish with a soft cloth after about 10 minutes.

11– Draw a 4½" circle on a piece of copper and cut out with snips. Draw a 2¼" circle inside this.

12– With ball peen hammer strike several rows of blows between the two circles, as shown at C, until you have shape formed.

13– Clean, polish, planish and color tray.

QUESTIONS– What are the six steps in squaring-up a board? What is the difference between an arris and a corner? What is grain in wood? What is the difference between a bevel and a chamfer? Should you sandpaper with or across the grain of wood? If by pounding the copper it becomes hard, what can be done to soften it? What does anneal mean?

Designed by Clifford B. Smith, Buffalo, New York.

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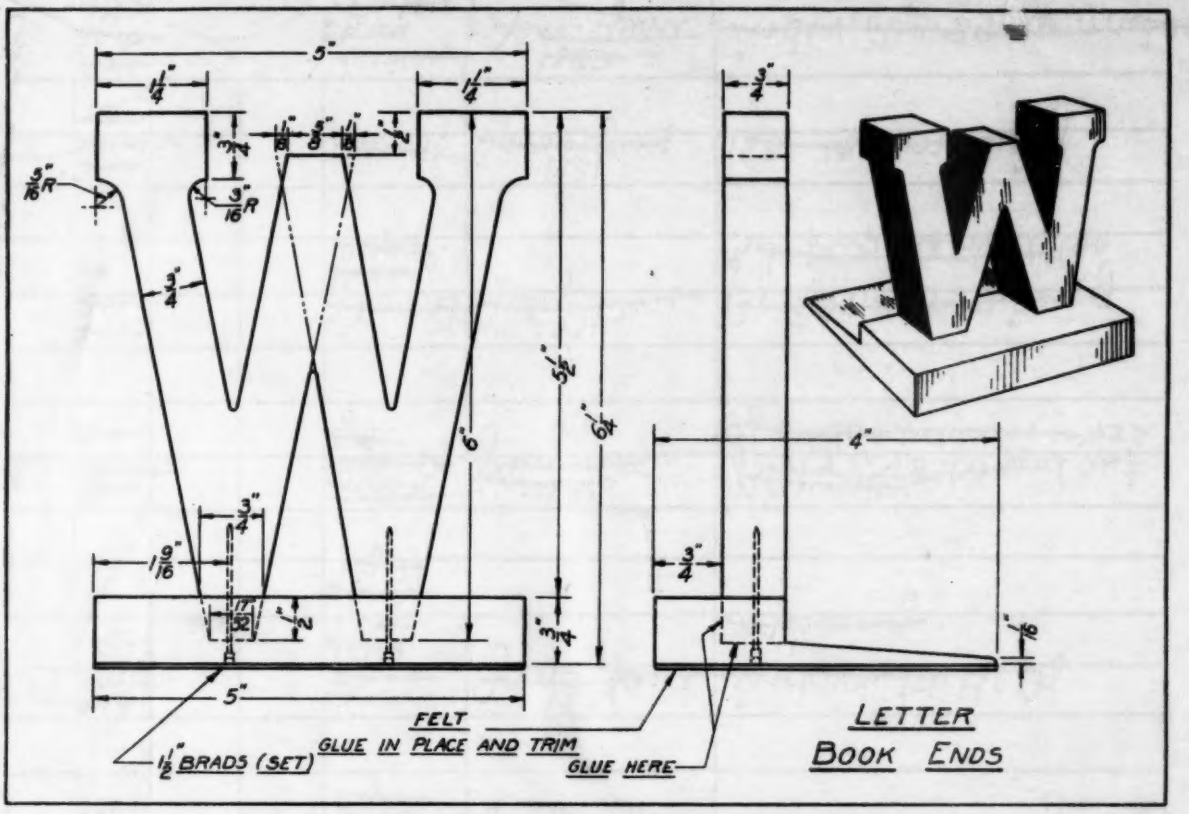
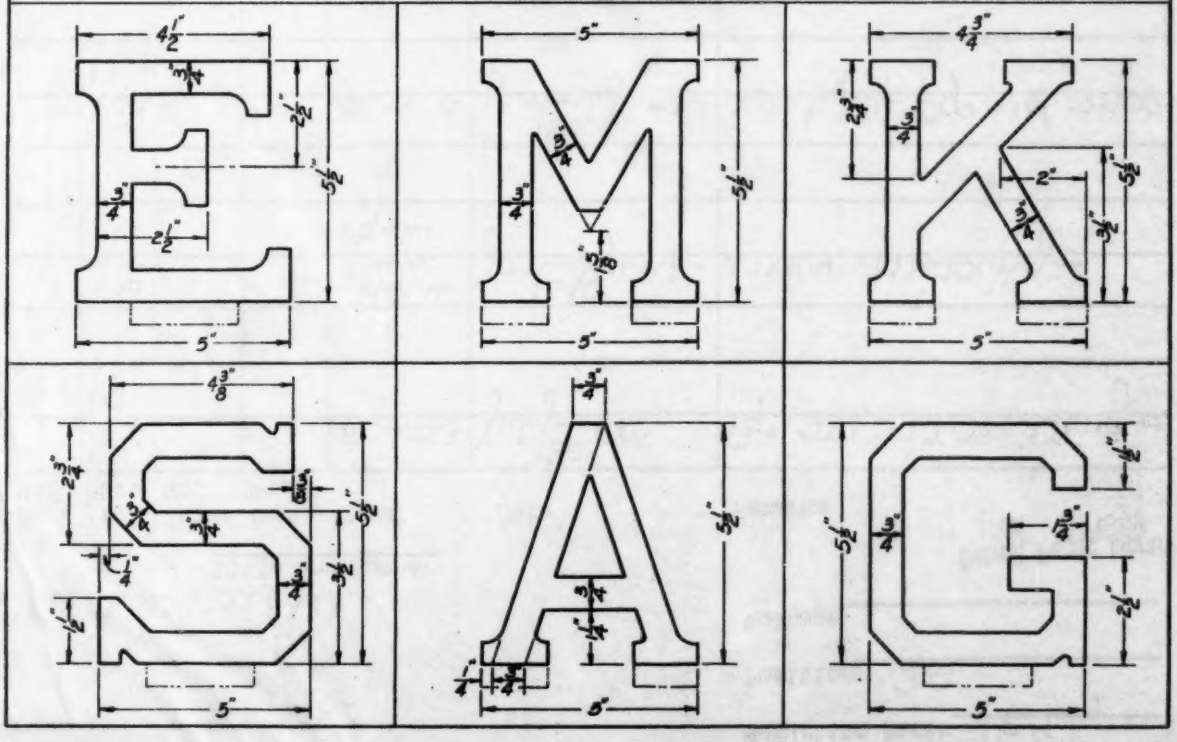


SUGGESTED LETTERS FOR BOOK ENDS

GIVING GENERAL DIMENSIONS ONLY



Designed by W. A. De Vette, Erie, Pa.

For Description See Page 17, Industrial-Arts Magazine, January, 1930.

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PROBLEMS AND PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in woodworking, turning, patternmaking, machine-shop practice, sheet-metal work, forging, foundry work, auto mechanics, auto electricity, electricity, architectural and mechanical drafting, printing, bookbinding, concrete work, farm mechanics, home mechanics, and other lines of industrial-arts work are desired for consideration.

BLUE-PRINT READING

C. H. Niemann, Hammond, Indiana

Connecting Rod

(See Supplement No. 161)

1. Explain how the oil tubes are held in the ends of the connecting-rod shank?
2. What is the purpose of detail No. 5?
3. What is the draft angle on the connecting-rod shank?
4. Why is this draft angle necessary?
5. Why is the face-to-face dimension on the connecting-rod shank less than the center-to-center distance?
6. Tell why it is necessary to use an oil scoop on this connecting rod?
7. Details 8 and 13 show special shims. Why are shims used?
8. Details 6 and 10 are lock washers. Explain why it is necessary to use them?
9. Find the center-to-center distance between the bolt holes on the big end of the connecting rod.
10. "f" means finish. Why are finish marks used?
11. What kind of lines are used to show the bore in the top view of detail 2?
12. How can you tell whether bolt No. 9 or No. 12 goes through detail 10?
13. How high above the center line is the seat for the bolt head on detail 3?
14. Give the web thickness of the connecting-rod shank at the big and small ends?
15. Add up all of the items coming between the head of the bolt and the nut and find out if the "grip" for bolt (12) given in the table is correct?

Note: The fifteen problems and questions may be divided into three units and each one called a JOB. The student's work should be thoroughly checked upon completion of each JOB.

A CHILDREN'S PLAYROOM SET

D. E. Kellogg and W. A. DeVette, Erie, Pennsylvania

(See Supplement No. 162)

A children's playroom set which is substantial in design and at the same time simple to construct, is illustrated in the accompanying supplement. It is designed in such a way that it may be built in a very short time and does not allow a pupil's interest to lag. The set is composed of a straight chair, a rocker, and a settee. The seats and the backs of all three are upholstered in leatherette.

To begin the construction of the set, the pupil should lay out a pattern for the sides on a piece of paper. This should then be cut out, and used as a template for laying out three of the side pieces. Each of these pieces must then be fastened to one of the remaining side pieces with brads, and then the three sets are to be cut out on the band saw, sawing through at point A indicated on the illustration, in order to get at the part to be cut from under the arms. A No. 10, 2½-in. f.h.b. screw put in from the back will effectually close the joint.

The forms, after they have been sawed out, may be smoothed either by using a wood rasp and sandpaper at the bench, or by sanding all possible portions on a sanding spindle placed in a lathe.

The pieces for the rockers should be carefully selected, fastened together, sawed out and smoothed in the same way as the sides.

The seats and the backs for the chair and the rocker are also made in the same manner as the foregoing, while the seat and the back of the settee must be made separately.

The assembling is begun with the rockers and rocker sides which are fastened together with No. 10, 2-in. f.h.b. screws through the bottoms of the rockers.

On one of the sides lay out the position of the seat and back, locate the position of the screws and bore 3/16-in. holes. Use this piece as a master template for boring the others. Fasten the pieces with No. 10, 2-in. r.h. blued screws.

The set may be finished with stain and shellac, lacquer, or duco. This must be done before the upholstering is begun.

In upholstering, the sides and rear edge of each seat and the sides and lower edge of each back are fastened flat, the stuffing is put in a little at a time from the open edge and evenly distributed. The open edge must then be pulled down and taped.

Bill of Material

6 pc.	¾ x 12 x 20	Sides	Poplar
2 pc.	¾ x 9¼ x 12	Chair Seats	Poplar
1 pc.	¾ x 9½ x 23	Settee Seat	Poplar
2 pc.	¾ x 9¼ x 11	Chair Backs	Poplar
1 pc.	¾ x 9¼ x 22	Settee Back	Poplar
2 pc.	¾ x 3 x 19	Rockers	Poplar
2 pc.	8 x 9½	Backs	Leatherette
2 pc.	7 x 9½	Seats	Leatherette
1 pc.	8 x 20	Back	Leatherette
1 pc.	7½ x 21	Seat	Leatherette
6	Dowel buttons, ½ in. diameter		
30	No. 10, 2-in. r.h. blued screws		
6	No. 10, 2½-in. f.h. bright screws		
12	No. 10, 1½-in. f.h. bright screws		
1	gross upholstering tacks		
7½	yd. upholstering tape to match the leatherette		
2	lb. of sea moss or other padding material		

LETTER BOOK ENDS

W. A. DeVette, Erie, Pennsylvania

(See Supplement No. 164)

The book end shown in the accompanying illustration with the school letter finished in duco or other enamel will not fail to take a class by storm.

The construction, while similar to many other book ends, has in addition the band-saw or coping-saw work necessary for the formation of the letter.

If the letter has an opening, such as is found in the letter A, it will be necessary to saw into the hole at some point in the direction of the grain. When the hole is formed, the saw should be run out at the same place where it entered. A small

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amount of glue should then be inserted and the cut clamped tight. The cut will not be noticeable when finished.

Shellac may be used instead of glue, in fastening the felt pad in place.

FERNERY FOR TEN-INCH BOWL

Gerald A. Boate, Seattle, Washington

This fernery has slim, graceful lines and curves and although simple in construction, is beautiful when well finished.

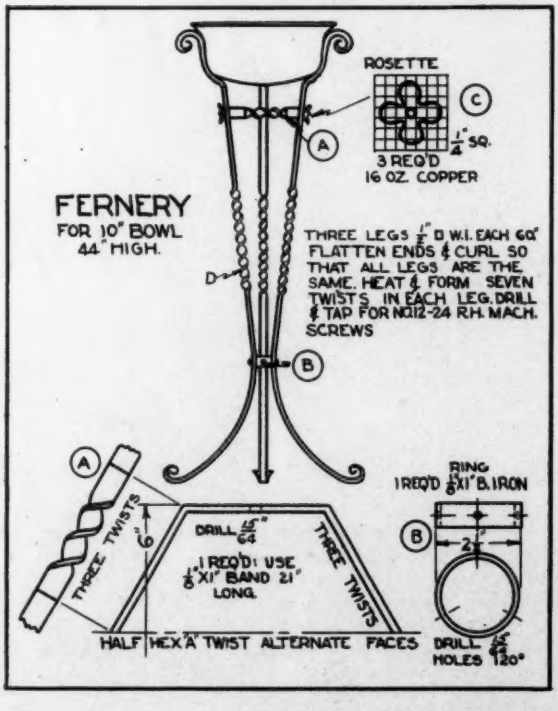
List of Material

1 pc.	⅛ x 1 x 21	Upper Hexagon	Strap Iron
1 pc.	⅛ x 1 x 8	Lower Ring	Strap Iron
3 pc.	No. 20 1½ x 5½	Rosettes	Copper
3 pc.	½ x ½ x 60	Legs	Square Iron

Bend a piece of No. 12 annealed iron wire to the shape of one of the legs. When the curves are satisfactory, tack the wire on a piece of smooth board. Use double-pointed tacks to fasten the wire to the board in such a way that the curves will stay in place. This wire will then serve as a pattern so that curves in all three legs may be made the same.

All of the parts of this fernery are forged. To do this, build a high, clean forge fire and carry it well past the coking stage. Attend to the fire yourself, and do not allow anyone to use it for heating other pieces of iron until you are finished. The secret of success with this work is to get and maintain a bed of clean glowing coal, through which only enough air is blown to keep the fire up. Have someone assist you as a helper, who will instantly do just what he is told. With a hack saw, cut off three pieces of ½-in. square bar iron each 60 in. long. Place the ends of the three pieces in the forge and heat each about 3 in. back from the end to a cherry red. Be careful not to burn the iron by getting it too hot. When the iron is hot enough, get your assistant to hold the cold end while you spread and draw the hot end of the bar down flat to about ⅛ in. thick at the point. Do this to each of the pieces on both ends. As each end is finished, it should be quenched in water. After the last end has been forged, rake up the fire so that it will be wide and well above the forge rim. Shove the three pieces through the fire so that they will become heated near the center for a distance of about 10 or 12 in.

Adjust the draft through the fire so that all pieces will heat slowly and evenly. Have your assistant open up the jaws of a metal vise about ½ in., and the jaws of a 10- or 12-in. monkey wrench to just a little over ½ in. Lay the wrench and a 1½- or 2-lb. machinist hammer close to the vise. Chalk a mark on each leg about 16 in. from the end. Station your asssistant at the vise so that he is ready to tighten it instantly when he is told. The work must be done quickly as seconds spell success or failure. When the iron is hot enough, catch hold of it with the tongs, and rush it to the vise. Holding it vertically with the chalk line just showing above the vise jaws, and have your assistant tighten the vise with speed and force. Drop the tongs, and place the monkey wrench over the iron a couple of inches above the vise jaws. Twist the wrench right around, and keep sliding it upward until seven complete turns have been evenly made. Now loosen the vise and place one end of the leg back in the fire. Put the twist on the other two legs in the same manner. Try to get all of the twists uniform.



The forming of the rolls at the ends is very easy, but the heating must be done carefully as the splayed ends are thin and will heat very quickly. Take the leg with the heated end to the anvil and slightly curl over the horn, then with light blows beat downward thus causing the end to curl up like a leaf. Repeat this on all of the ends. Now reheat the ends which are to form the top of the stand and reverse the curves to form the bowl holder. When the three match, quench and heat the opposite ends and shape them in a long graceful curve, which is almost flat where the circular ring is fitted. The center of this ring comes about 12 in. above the floor.

The upper and lower rings are fastened in place by three No. 12 — 24 r.h. machine screws. Care must be used to center-punch for these screws not only centrally, but so that the ring when fitted will have its edges horizontal.

To form the hexagon, cut a bar of ⅛ by 1-in. band iron, 21 in. long. File the ends, or grind them so that they will be slightly beveled from the inside. This bevel is to form a trough which will hold the melted spelter while brazing and insure making a good strong bond. An oxygen welding and cutting outfit will do the job quicker and better if one is available. Of course, the hexagon, as well as the lower ring, may be hand-welded at the forge, but this is rather a difficult job for the average boy.

The 21-in. piece, after having the ends filed, should be marked off with try-square and red marking pencil, drawing lines across every 1¾ in. Heat and twist the first, third, and fifth spaces while the bar is in the flat. See that the ends are in the same plane when done and that there are two complete twists in these spaces. Now check the red lines and make any changes necessary to have each piece the same length. Bend the bar into a hexagonal form, using the vise and a heavy hammer. When finished the closed beveled ends should form the apex of one angle, and the bevel should be on the inside. Braze the two ends together, and drill and tap for a No. 12—24 r.h. machine screw on the exact center of each plain face. The leg holes should be drilled 15/64 in. The forging and drilling of the circular ring should present no difficulty. It is made from a piece of band iron, ⅛ by 1 by 8 in. The making and attaching of the rosettes will present little or no difficulty.

To decorate this project, use slate lacquer as a body coat, touching up the twists with stem green and gold. The rosettes may be given rich blue petals and deep yellow centers. Use clear lacquer over all as a final finish.

A SUN-BOWL ELECTRIC HEATER

Paul J. Rupprecht, Lindblom High School, Chicago, Illinois

The electric heater described herewith is of the sun-bowl reflector type. It was made by a first-year high-school boy out of a discarded fan base and an aluminum mixing bowl. Of course, this job does not compare, from an artistic standpoint, with the spun metal reflector bowls that can be bought in the market, but it serves to stimulate the boys to turn discarded parts of machinery into something which they can use.

The heater was made in ten hours and makes an excellent junior-high-school project. It is really only an assembling job which requires a little soldering, and some machine-screw tapping.

SUN-BOWL ELECTRIC HEATER

A split porcelain sign-type socket fitted through a hole cut into the base of the bowl, provides the necessary support for the purchased cone-type heater replacement unit. The job was then completed by shaping up a wire-protecting guard of galvanized-iron wire. Round-nose pliers served to make perfect eye loops in the radial members. These in turn were squeezed around the two rings and soldered smoothly in place. Small metal clips fasten the completed guard permanently to the bowl with machine screws and nuts. The large hole for the porcelain socket in the base was cut by first drilling a series of small holes around a scribed ring which was then filed smooth.

MAGNETIC TACK HAMMER

Paul A. Brazier, Morrill School of Mechanic Arts, Concord, New Hampshire

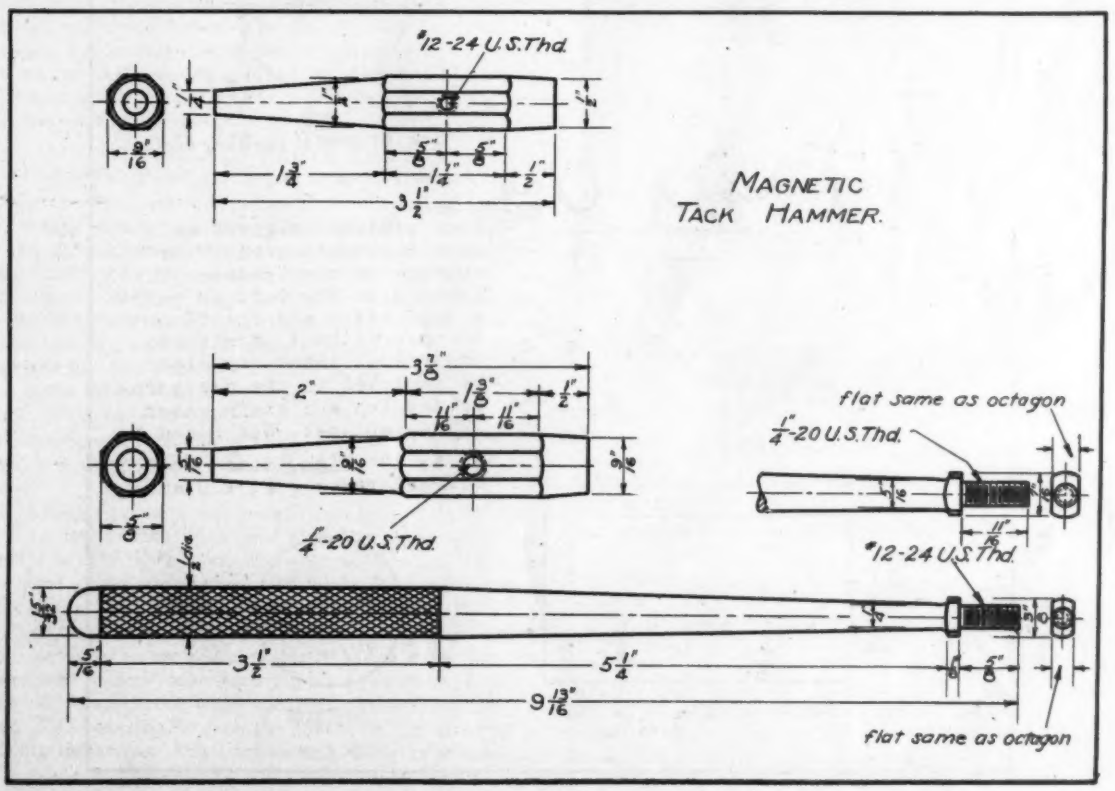
This project gives the machine-shop student practice in straight and taper turning, threading and tapping, knurling, hardening, tempering, and magnetizing. The head is made of a good grade of octagon tool steel and the handle of machine steel, either black stock or cold rolled.

Operations for the Head

1. Cut off the stock long enough to remove the centers when finished.
2. Center the ends.
3. Turn a taper on the large end.
4. Turn a taper on the small end.
5. Hold the stock in a 4-jawed chuck and square the ends to length; file, and polish.
6. Drawfile and polish the flats of the octagon.
7. Lay out, drill, and tap the hole for the handle; countersink slightly both sides of the hole.

Operations for the Handle

1. Cut off the stock long enough to remove the centers when finished.
2. Center the ends.
3. Turn a ½-in. diameter the full length.
4. Knurl.
5. Turn a 15/32-in. diameter and rough form radius.
6. Lay off the lengths and turn the taper; use a piece of zinc in the lathe dog.
7. Turn the shoulder diameter.
8. Turn outside diameter of the thread.
9. File and polish the taper and shoulder.
10. True up in the chuck and finish form radius and polish.
11. Thread with a die.
12. Screw into head, tight to the shoulder, and mark the corners of the octagon on the shoulder.
13. Unscrew and file a flat on each side up to the marks.
14. Harden and temper the head.
15. Polish the head all over.
16. Magnetize. (This may be done by the electrical department.)
17. Assemble handle and head, cut off the extra length of the thread with a hack saw and peen in place.
18. File and smooth up the peen.



CONTRACT FOR GENERAL METAL SHOP

E. W. Manzer, Supervisor of Manual Arts,
Bronxville, New York

Contract: Hall or Porch Lantern.

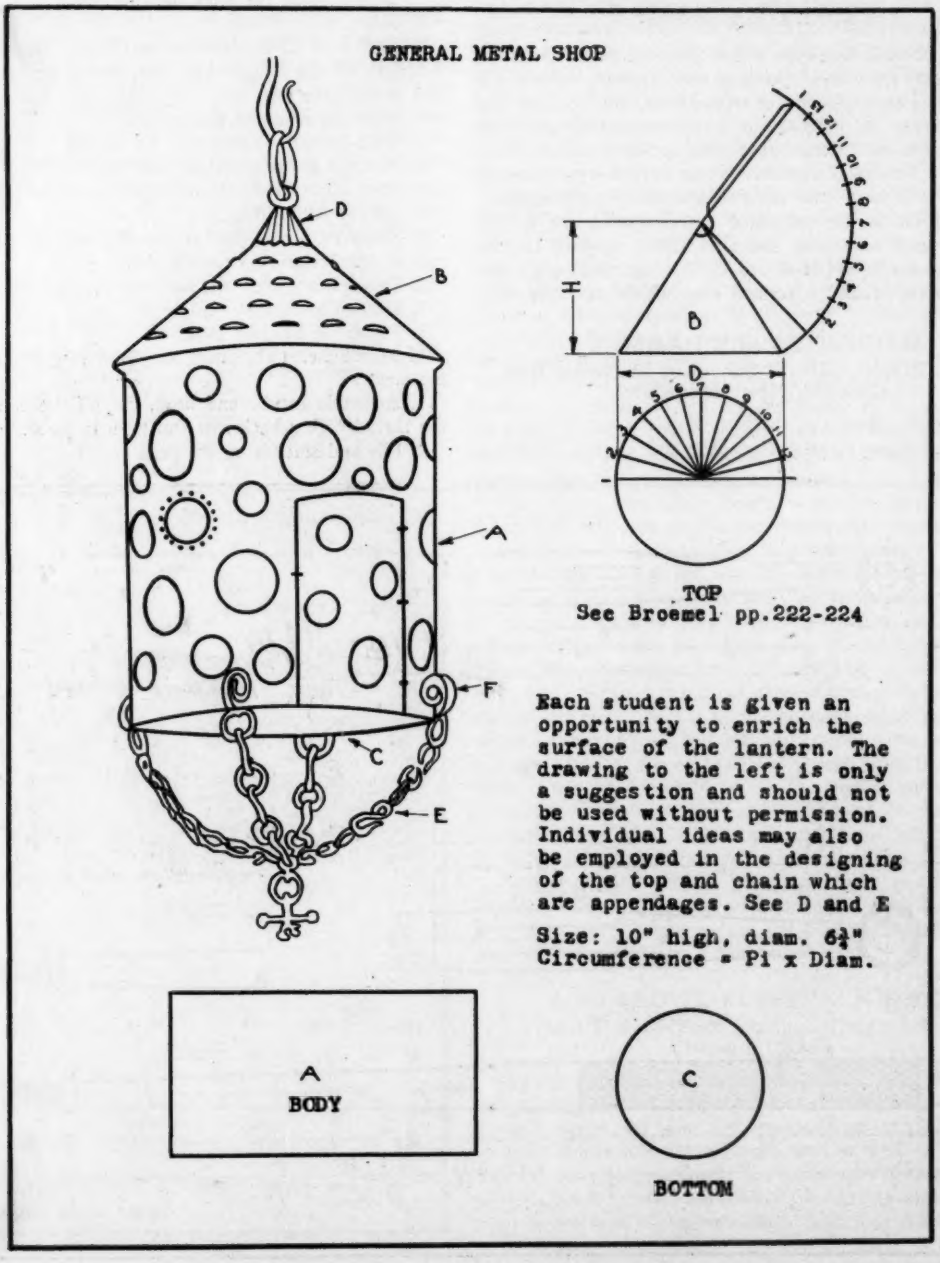
Specifications: Use 20-gauge copper or 24-gauge sheet iron; copper tacks cut off for rivets; sheet celluloid to cover the openings; wire solder with rosin core; electric cord and socket; other material as per design requirements.

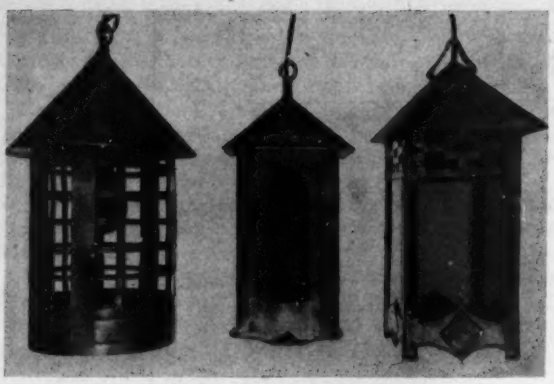
Tools: Sheet-metal tray; jigs; shop tools and machines as required.

Part I — Body

Procedure:

1. Make a dimensioned sketch of your idea for the lantern. Get the instructor's O.K.
2. Develop pattern on heavy paper. Get the instructor's O.K. and cut out.
3. Transfer the pattern to the metal. (See Broemel, pp. 151–155.)
4. Cut out the pattern with hand snips. (See Broemel, pp. 156–162.)
5. Locate the openings as per your design.
6. Cut out the openings. How will this be done? Analyze your problem .
7. File the edges of the openings to line. Add other surface enrichment.
8. Rivet the celluloid over the openings. If glass is used, see instructor.
9. Form the body on a wood mandrel or jig. Use a rawhide mallet.
10. Locate and drill the holes for the rivets in the lap seam. (See Fig. 148, Broemel, p. 165.)
11. Rivet the seam with copper or iron rivets. Use a rivet set.
12. Planish the surface where desired, or planish the whole surface.
13. Solder glass brackets if glass is used. See instructor.
14. Clean the surface with steel wool. Apply tripoli on wet waste, and polish.


GENERAL METAL SHOP
D
B
A
F
C
E
H
B
D
TOP
See Broemel pp.222-224
Each student is given an opportunity to enrich the surface of the lantern. The drawing to the left is only a suggestion and should not be used without permission. Individual ideas may also be employed in the designing of the top and chain which are appendages. See D and E
Size: 10" high, diam. 6¼"
Circumference = Pi x Diam.
A
BODY
C
BOTTOM



SOME RESULTS OBTAINED WITH THIS CONTRACT

15. Make out a material bill on the back of your cost card for the job.
16. Have the work approved by the instructor.

References:

Broemel, Sheet Metal Workers' Manual, pp. 151–228.
Pane, Art Metalwork, pp. 15–16, 21–34, 106.
Rose, Copper Work, pp. 113–114.
Welch, Elements of Sheet Metal Work, pp. 11–29.

Part II — Top

Procedure:

1. Develop the pattern for the top. (See Broemel, pp. 222–228.)
2. Cut out the pattern in paper, and fit it to the top. Get the instructor's O.K.
3. Transfer the paper pattern to the metal and cut it out.
4. Form pattern to the desired shape.
5. Rivet or solder the lap.
6. Enrich the surface if the design calls for it.
7. Clean all surfaces with steel wool.
8. Solder the top to the body. Use a Bunsen burner for doing this.
9. Prepare the surface for the final finish.
10. Make out a material bill on the back of the cost card.
11. Have the work approved by the instructor.

Note: For outside reading, see references given in Part I. Do not put off the reading until the job is finished. Much valuable information will be found in the reading. Supplement your shopwork with theory.

AN INLAID FRUIT TRAY

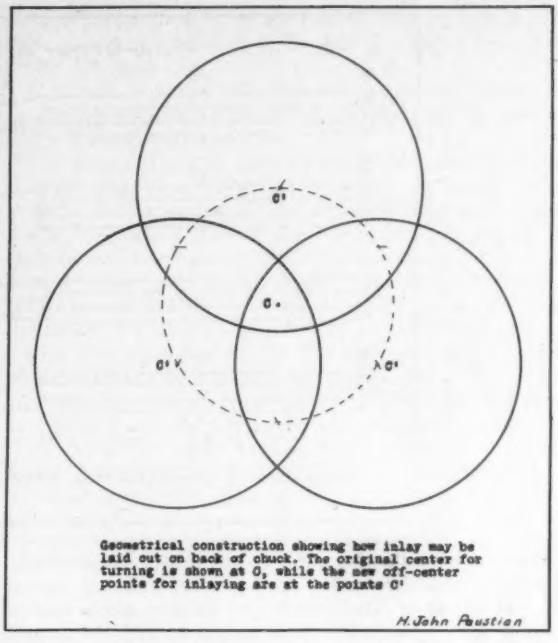
H. John Paustian, Grand Island, Nebraska

The accompanying illustrations show what might be done to beautify an otherwise very plain fruit tray.

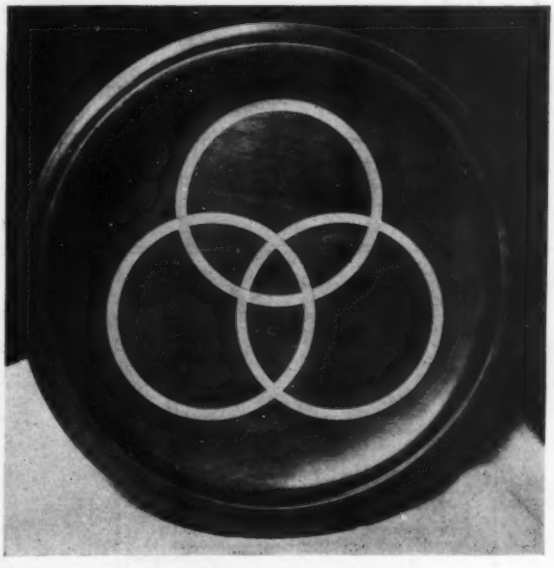
The stock originally used for this project was walnut, but other hard woods might be used equally well. The lumber was glued up to measure 2 by 10 in. The glued-up stock was band-sawed and mounted on a faceplate. The outside was then turned and sanded. Next, a chuck was made of 1¾-in. white pine, the tray chucked and the inside turned, but not sanded. The design used is similar to the one shown on page 152 of the April, 1925, issue of the INDUSTRIAL-ARTS MAGAZINE. The bottom of the tray should be left at least ⅜ in. in thickness, because it will be taken down more before the inlay is completed.

The inlay rings were next turned from holly, 3/16 in. thick by 3 in. inside diameter. A good plan is to taper these rings slightly toward the bottom. The grooves in which the rings are glued should also be tapered slightly. This will insure a tight fit.

The faceplate on the white-pine chuck was next moved from its center to one of the points C′ shown in the illustration. There is considerable vibration in eccentric turning, especially if the project is large, and high speeds should not be used. With considerable care, the groove for the first ring is cut into the bottom. This requires skill. The ring is glued in,


C′
C
C′
C′
Geometrical construction showing how inlay may be laid out on back of chuck. The original center for turning is shown at C, while the new off-center points for inlaying are at the points C′
H. John Paustian

the glue allowed to set, and the whole surfaced flush with the tray bottom. The faceplate is then moved to the next off-center point C′ and another inlay completed, as before. When the inlay is entirely finished, the faceplate may be returned to the center position, the bottom surfaced true, sanded and filled. A rubbed varnish finish is to be preferred.



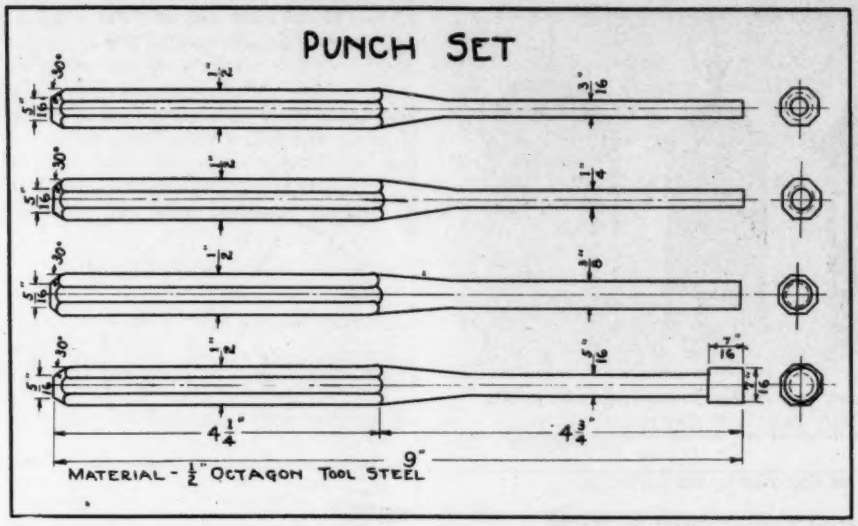
INLAID FRUIT TRAY

The tray of walnut and the inlay of holly make a very pleasing dark and light contrast, though other combinations may be made which are just as pleasing.

PUNCH SET

Lemuel Harris, Nogales, Arizona

The shop instructor is often confronted with the problem of selecting a shop project that will involve a number of fundamental processes and will at the same time be of practical use, either to the school shop or to the pupil. The accompanying drawing, consisting of a set of four punches, is designed for use particularly in the auto shop and involves a number of processes, such as annealing, centering, counter-



sinking, rough-cutting, cutting to dimension, finish-cutting, measuring, shoulder cutting, angle cutting, polishing, cutting off, and tempering. The similarity of the four pieces tend to increase the student's skill as he progresses with the set due to the repetition necessary. The difference in the dimensions of the four punches, however, make the project really four separate problems.

The punches are made of ½-in. octagon tool steel. It is necessary to anneal this steel before it can be successfully worked on the lathe. The four pieces of steel are cut to length, an allowance being made for waste on each end for cutting off on the lathe. The pieces are then heated to an even cherry red throughout. After they have been removed from the fire, they are completely covered with air-slaked lime to exclude the air, and then allowed to cool.

After the punches have been finished in the lathe, it will be necessary to restore the steel to its original condition and to harden the points. The entire punch is first heated to a cherry red and allowed to cool naturally. This will restore the steel to its original degree of hardness.

To temper the point, the punch is heated from the point back for about 2 in. to an even cherry red. It is then chilled for about ¾ in. from the end by holding the tip of the punch in oil or water until the red has practically disappeared from the steel above the point of immersion. The chilled portion of the punch is then polished to expose the colors as they are drawn to the end of the punch. When the tip has been drawn to a light-blue color, the entire punch is immersed in cold water and allowed to cool.

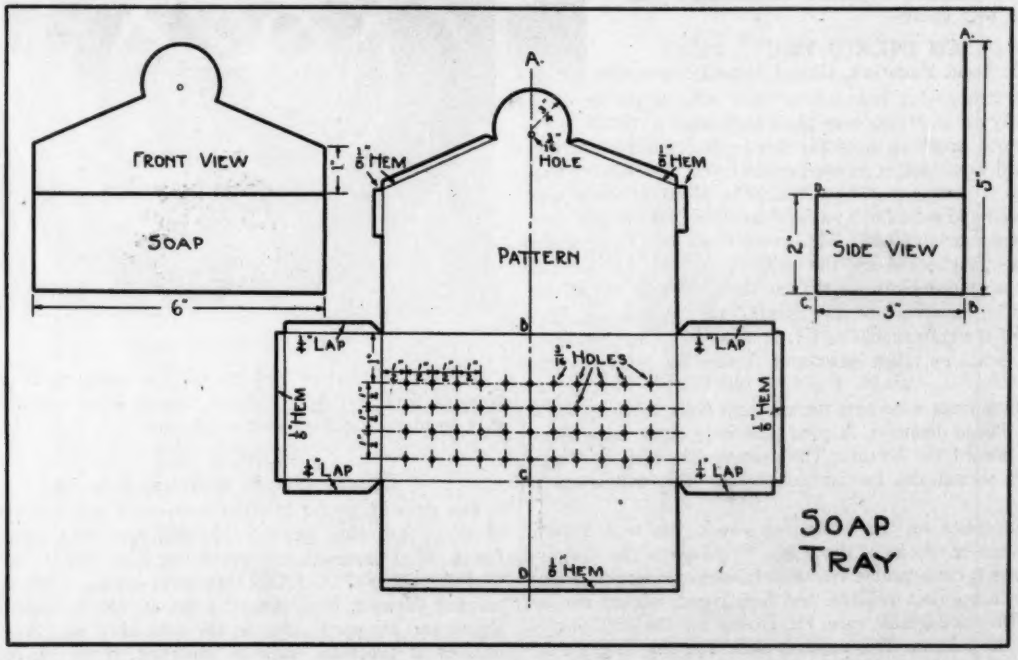
This set of punches may also be used as a project in forging.

SOAP TRAY

Edward Stein, Adjustment School No. 50, Buffalo, New York

One of the many interesting and useful projects that can be made in the sheet-metal shop is the soap tray. It is a good job for the younger student as well as for the older boy. The layout may be made by the boy, or the shape can be marked off from a pattern.

The problem introduces the use of the center punch and of the drill press for drilling the 3/16-in. holes. A No. 3 solid



punch is to be used for punching the holes if a drill press is not available. The raising hammer is used to depress the bottom slightly so the soap drippings will flow out through the 3/16-in. holes. No. 28 galvanized iron is best for this job.

Lay out the pattern as shown, taking the measurements for A, B, C, and D from the side view. Lay out the drip holes and drill with a 3/16-in. drill. Cut the pattern out and fold the hems.

Place the pattern in the brake and bend on lines B and C. Bend the sides on the square stake fitting the front lapse in the front hem.

Solder the sides. Depress the bottom slightly with the raising hammer so that the soap drippings will readily drain through the drain holes. Smooth all corners and edges with a file and paint the tray.

TABLE LAMP

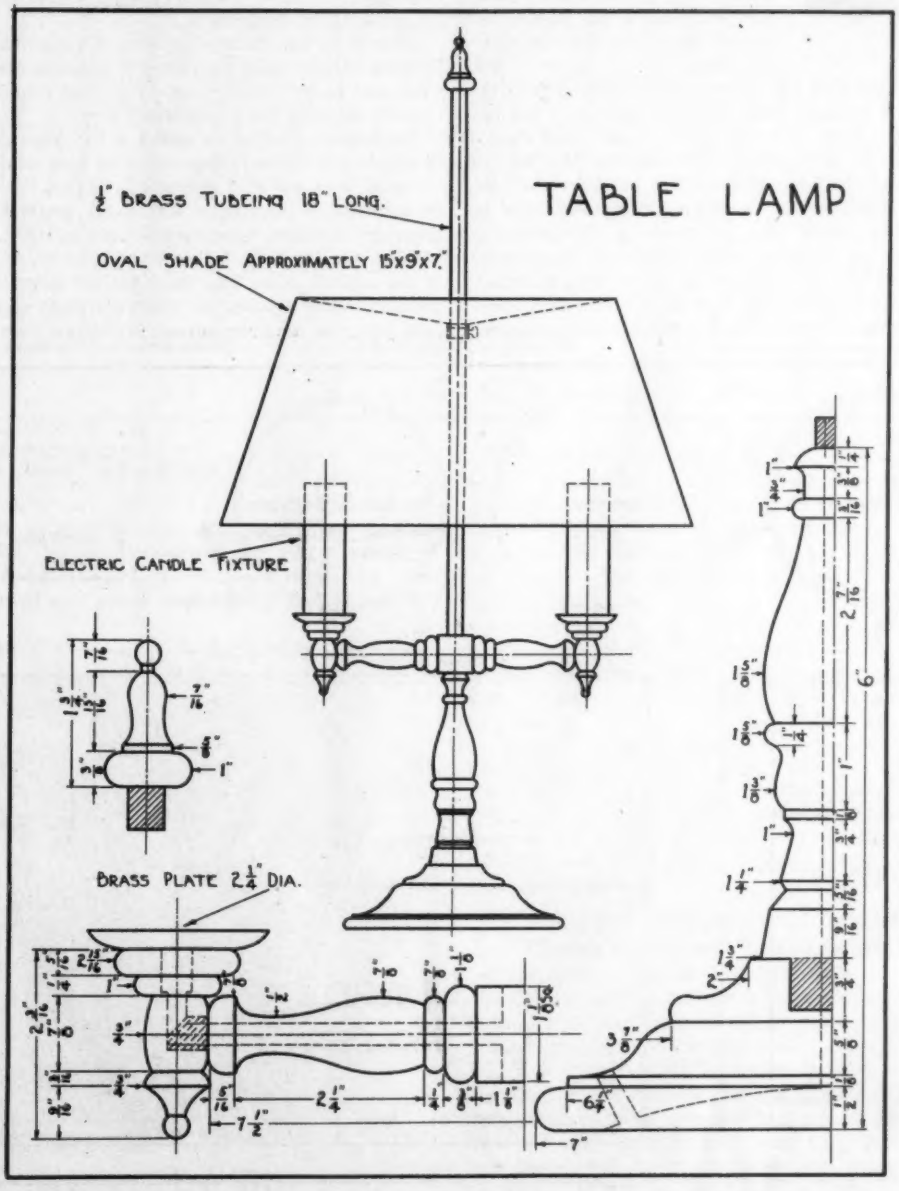
Ward M. Alexander, Morrell High School, Irvington, New Jersey

The table or desk lamp shown in the accompanying illustration not only serves as an excellent project in woodturning, but is a change from the turned type of lamp we have so long been accustomed to. Walnut, finished in a rich brown tone, serves very well.

It is quite important that all tenons are turned carefully to fit the size of holes for which they are intended, in order to insure the necessary support.

The fixture is held in place by means of a piece of ⅛-in. threaded pipe, ¾ in. long, that is let into the fixture holder about ½ in. The brass drip plate is spun to shape in the lathe. To do this, take a piece of No. 18 gauge brass, 2¼ in. in diameter and fasten it with two screws to the end of a short piece of wood turned slightly larger than the diameter of the candle casing. The screws should be placed far enough from the center so that a ⅜-in. hole may be drilled through the center. With a gouge or round-edged tool, bend back the edge of the plate as the lathe revolves rapidly. The plate is then removed from the wood and slipped over the threaded pipe. It is securely held down when the fixture is screwed on.

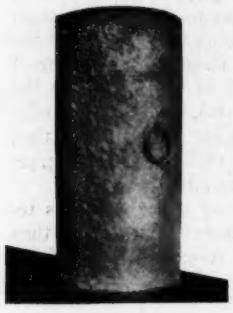
All the wiring should be done before gluing the parts together. A small round switch in the base is much better than the usual chain-pull sockets for this lamp.



UMBRELLA HOLDER

Edward Stein, Adjustment School No. 50,
Buffalo, New York

The umbrella holder described herewith, is very popular. In most sheet-metal shops, the making of a length of stovepipe is included in the course of study to cover the groove seam exercise. After the pipe is made up, it is put under a bench to take up space or it is cut into scrap.



UMBRELLA HOLDER

This umbrella holder takes the place of this exercise. It merely requires the wiring of the two ends of the pipe, the placing of a bottom in one end, the application of a beading on the other end, soldering of two rings on the sides and then decorating the whole with enamel or gesso to make a useful and decorative project, out of what was merely an exercise. No. 28 galvanized iron is used.

The pattern of the body can be developed as shown in the illustration, or its length may be obtained by multiplying the diameter which the holder is to have, by 3.1416. The allowances are then added for the grooved seam and the wire edges. The wiring is done after the grooved seam has been folded. The body is formed and grooved, and then a single bead is made ¾ in. from the bottom end. The disk for the bottom should be laid out about 1/6 in. larger than the opening. The allowance for the burred edge must then be added. After the burred edge is turned up, the bottom is snapped into the bead, and the whole is soldered. The grooved seam also should be soldered. Then the upper bead is formed. The rings are made by turning a piece of No. 6 wire about 48 in. long, around a length of 2-in. wrought-iron pipe in the same manner as though making a spring. The separate coils of the spring are then cut apart with a hack saw and the rings straightened out. The joint should then be soldered to make the ring look as though it were seamless.

All rough edges and soldered joints are next smoothed off with a file. After a polychrome or gesso finish has been applied, the student will find that he has made a real practical and attractive project.

MODERN WASTEBASKET

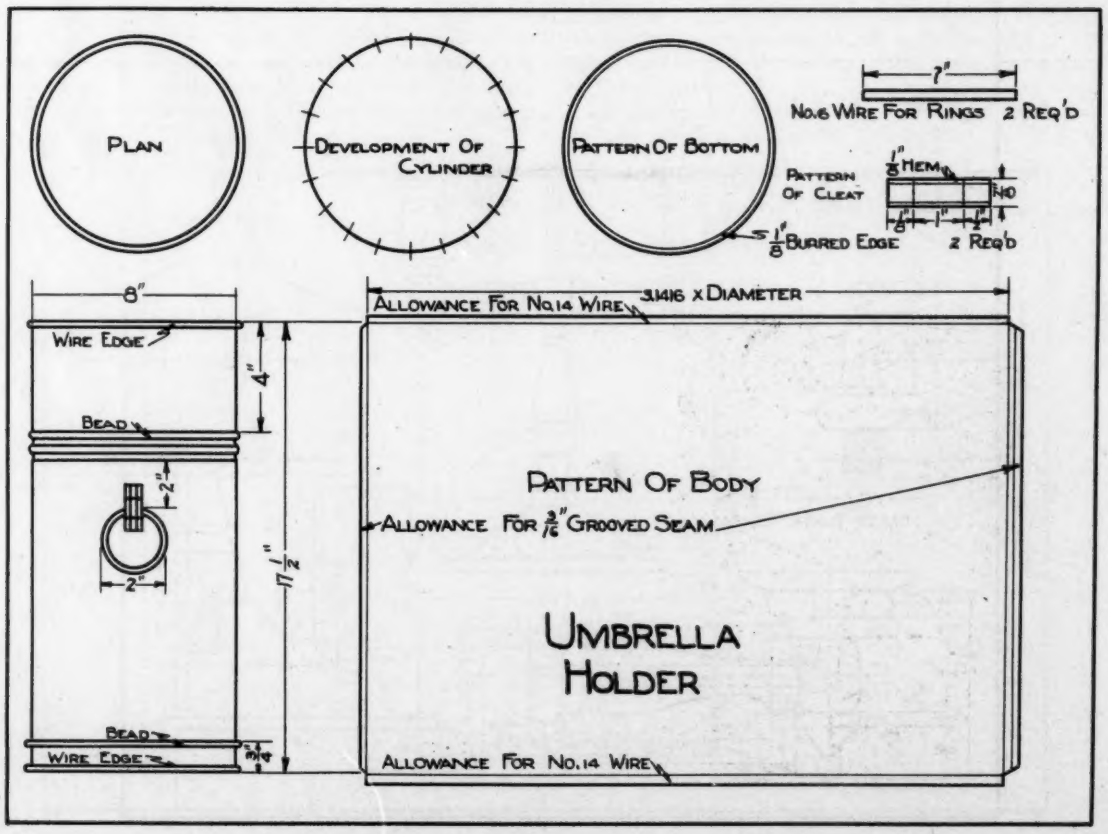
Geo. Dally, Boys' Technical High School,
Milwaukee, Wisconsin

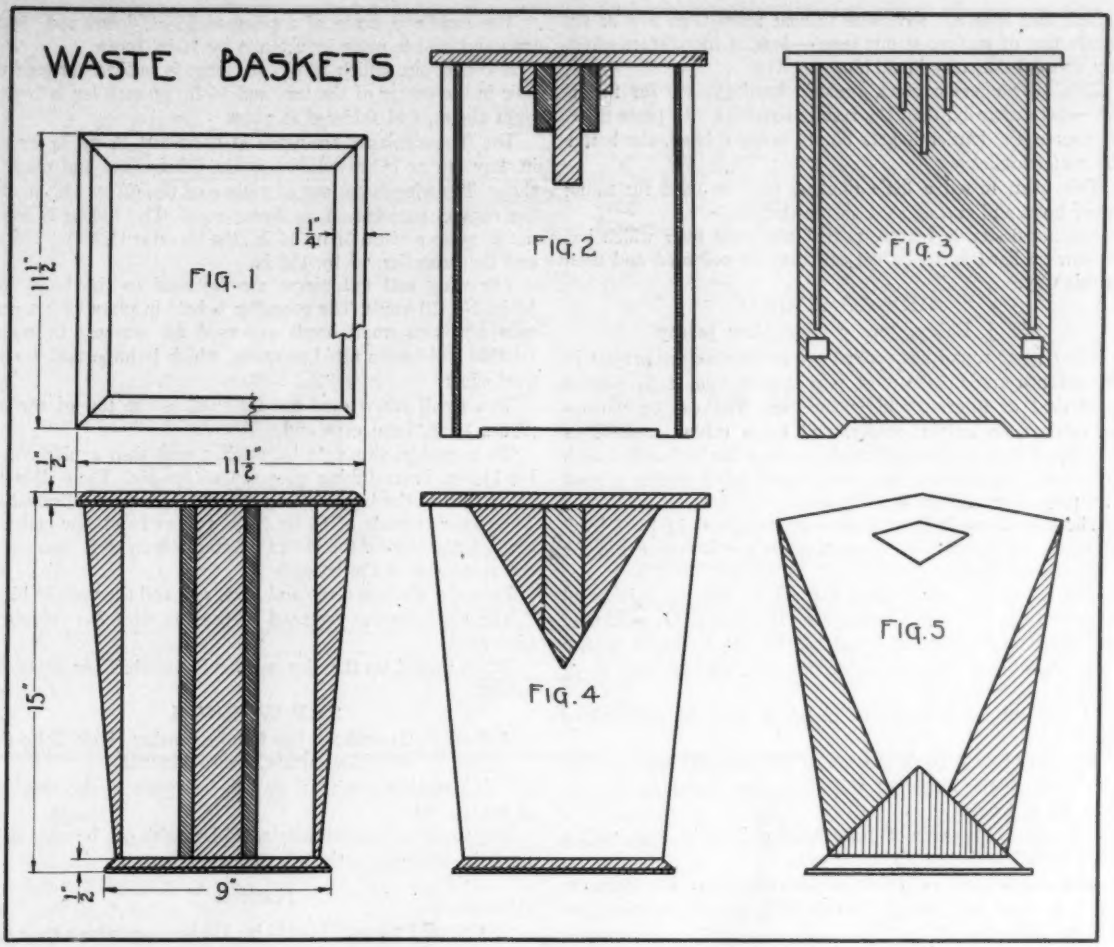
After making wastebaskets of various styles and combinations, I have concluded that a wastebasket which depicts the modern trend of furniture, such as is shown in the accompanying illustrations, makes an exceptional problem for a class in woodworking. It is not only one of the simpler pieces of furniture that serve well to introduce the boy to our modern style in furniture, but it is an example which may be analyzed by the instructor without fear of confusing his pupils with too large a number of unusual modern terms, a result which might possibly occur if a more complicated project were used for introductory purposes.

Through its use, the boy is given a rich opportunity to create his own design, study and develop beautiful wood combinations, and invent new ways and means of employing the machinery, found in the woodworking shop.

The modern wastebasket shown in the detail drawings, may be glued up of various lumber combinations; or the sides may be made from one kind of lumber and then inlaid; or it may be constructed from some soft wood, preferably bass, and decorated in colors, using modern lines, as shown in Figure 5.

When the kinds of lumber to be used in the construction of the modern basket have been decided upon, the four sides are glued up in two lengths, allowing enough surplus stock on each piece for trimming purposes. They are then cut to exact





length, and shape. Figure 1 shows a well-proportioned waste-basket of this type. A miter joint, which could be conveniently made on the variety saw, was used in its construction.

The bottom and the top strips were made from the same kind of lumber. Where the sides of the basket were constructed in one kind of lumber and inlaid, these strips were made to contrast, as is shown in Figures 2, 3, and 4.

MODERN WASTE BASKET

If decorative pieces, which are glued up of several varieties of lumber are used, (Figs. 2 and 4) they may be made of 1-in. lumber and then resawed, joined, and run through the planer on top of a flat board to plane them down to the desired thickness. The flat board should be placed below the pieces to be planed, to prevent the planer rollers from curling the thin material.

The example of inlay illustrated in Figure 3, is of the simplest type; the kerf which receives the inlay may be cut on the variety or common circular saw, and ⅛-in. veneer inserted. The spaces for squares were cut on the mortising machine.

Instead of using the more expensive woods, such as satin, holly, ebony, and others, for inlay and trim work, birch and mahogany may be used.

Walnut, sycamore, cherry, ash, butternut, magnolia, and chestnut, are other woods which may be procured, with little difficulty and which make excellent combinations for this woodworking project.

A FAST-DRYING WOOD FILLER

Thomas A. Gotschall, Colgan, North Dakota

Being rather rushed for time in finishing a job recently, I experimented with a mixture which promised faster drying, and was more than satisfied with the results which I obtained.

The ingredients and the mixing of the filler are very simple. Take the thinner which is commonly used for fast-drying lacquers, and mix it thoroughly into ordinary paste filler, until the mixture has the consistency of very thick cream. This liquid filler may then be applied with a stiff brush, and should be worked in well. As soon as the surface begins to dull, rub it off briskly. It dries so rapidly that very hard rubbing is re-

quired, and it is not advisable to coat more than five or six square feet of surface at one time — less, if the surface offers any unusual difficulty in rubbing.

This filler offers a good, smooth, hard surface for finishing — better, really, than the results obtained with paste filler. Of course, the harder it gets before being rubbed, the better the surface it leaves.

This filler, mixed a little thicker, may be used for filling larger holes and cracks, as it shrinks but little.

Another desirable feature is that old paste filler which has become so hard as to be useless, may be softened and used in this way.

AIRY-GO-ROUND

R. J. Reidy, Jersey City, New Jersey

The airy-go-round has proved a very satisfactory project in the seventh grade. Like most jobs that will *go*, it develops a good deal of interest and enthusiasm. The use of various materials such as tin, solder, and brass tubing make it a *diversified shop* project, although one that can be handled with almost any equipment. As a sheet-metal job it makes a good first project in surface development.

The base is made from a piece of basswood ¾ by 7 by 7 in. with a ¼-in. chamfer. A small screw eye is fastened in the center of the base.

The upright is made from a piece of No. 30 galvanized iron, or from an empty gallon can. If desired this part may be made from a piece of wood 1¾ by 1¾ by 10 in. with a ½-in. hole bored through the center, or it may be built up of ¼-in. or ⅜-in. stock.

If the upright is made of metal, it may be soldered or riveted.

Cut the piece E to fit the top of the upright, bore a ¼-in. hole through the center of this piece, and fasten it in place with ½-in. brads.

The piece C is made of 1-in. dowel rod, ¾ in. long, with a ¼-in. hole bored through the center.

The top is made of a 4-in. coffee-can cover. The flaps are ½ in. wide and the holes are made with a ⅛-in. twist drill, or they may be punched.

The handle is made of a piece of ½-in. dowel rod, ¾ in. long and held in place by a No. 4 by ½-in. screw.

A cotter pin, which is 2½ in. long, is pushed through the hole in the center of the top, and ½ in. of each leg is bent at right angles, and soldered in place.

The four airplanes are made of basswood ¾ by ¾ by 3½ in. Lay out as indicated at J in the illustration, and plane to shape. The wing is cut out of a piece of tin, ⅝ by 3¼ in., and the corners rounded off as shown at M. The rudder N is cut out of a piece of tin ⅝ by ½ in., the elevator O, ½ by 1½ in., and the propeller, ¾ by 1¼ in.

The wing and tail pieces are fastened to the body with ½-in. No. 20 brads. The propeller is held in place with a common pin, two small beads are used for washers to reduce friction and insure rapid spinning, which is important for the final effect.

Two small screw eyes are fastened in the top of the airplanes ⅝ in. from each end.

To assemble, slip a ¼-in. washer, and then a piece of ¼ by 1½-in. brass tubing over the cotter pin. Then slide the piece C over the brass tubing as indicated in the illustration. The motor is made of ⅛ by ⅛-in. rubber band, one end goes through the loop of the cotter pin, the other end is fastened to the screw eye in the base.

Paint the airplanes, top and base, red, and the upright black.

The airplanes are fastened to the top with No. 19 stovepipe wire.

When wound up the airy-go-round will whirl for about one minute.

TAP WRENCH

Alfred B. Grayshon, Jay Cooke Junior High School, Philadelphia, Pennsylvania

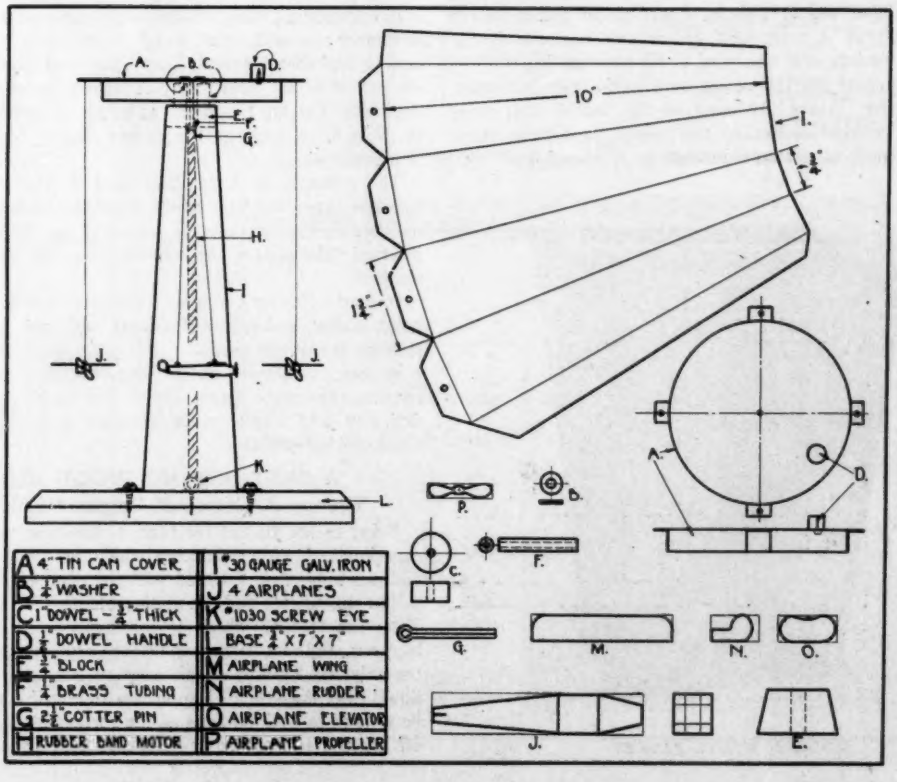
Tap wrenches are used by the mechanic in the shop and at home.

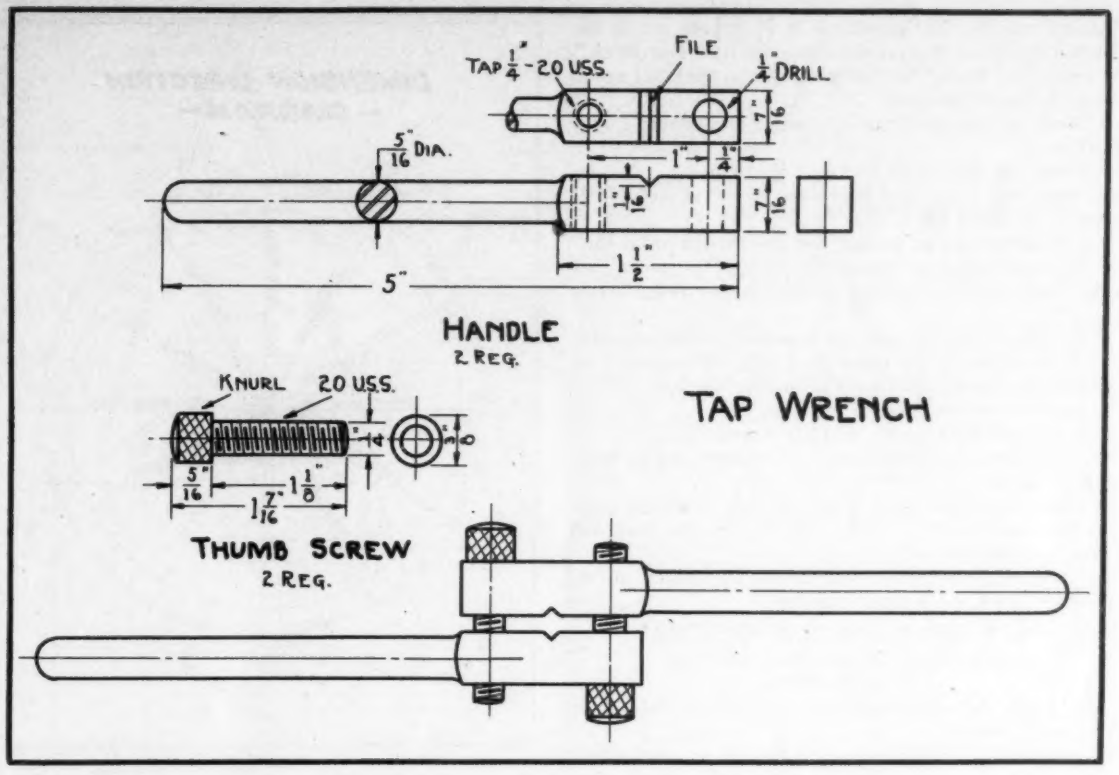
The small tap wrench illustrated herewith can be very easily made by any boy in the school metal shop.

Handles

Operations

1. Cut off 2 pieces ½ by ½ by 5⅛ in. c.r.s. with a hack saw.





2. Place in an adjustable chuck on the lathe and turn one end as shown.
3. File the round end smooth in the lathe.
4. Remove from the lathe and file the square ends.
5. Lay out the holes and notch.
6. Drill the holes as required.
7. Tap the proper hole.
8. File the notch.
9. Clean up the surface with a smooth file and emery cloth.

Screws

Operations

1. Cut 2 pieces ⅜ in. diameter by 1 9/16 in. c.r.s. with a hack saw.
2. Place in a universal chuck on the lathe, and face the ends and turn the diameter, as shown.
3. Reverse in the chuck and knurl.
4. Remove from lathe, and clamp in vise, protecting the knurl with a soft material. Then thread the end with stock and die.

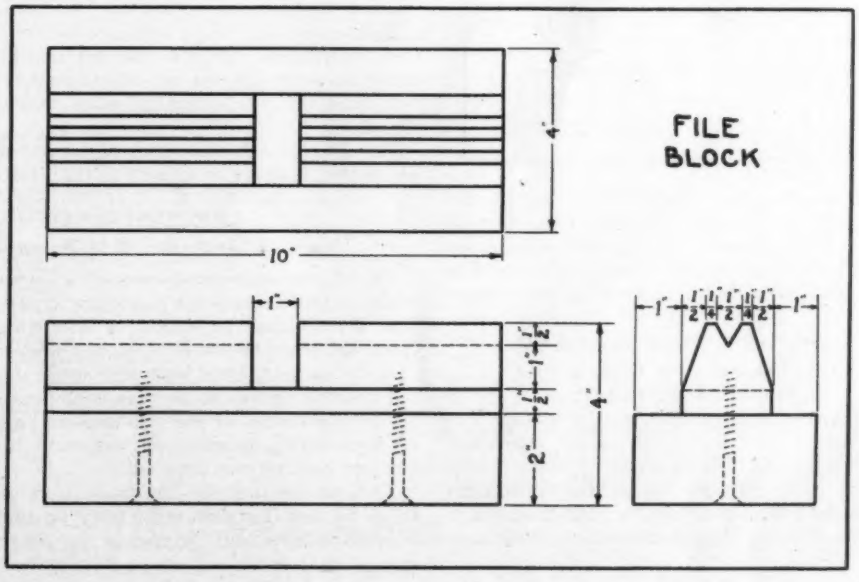
Remarks

As the parts are made of cold-rolled steel, they must be casehardened. This is done by heating the part red-hot and rolling it in kasemite or cyanide. Each heating and treatment makes the surface hardening a little deeper. Three treatments are sufficient. Immediately after the third treatment, drop the piece in cold water and then polish with emery cloth.

FILE BLOCK

Lloyd F. Green, Wheelock, Texas

The accompanying illustration shows a very popular project for the farm shop.



Anyone who has had experience in filing hoes out in the field, will appreciate this project. Some call it a "Hoe Block," and some "File Block." We finally decided on the latter name.

Steps in construction are:

1. Dress the base block to the following dimensions: 2 by 4 by 10 in.
2. Dress the upper block to 2 by 2 by 10 in.
3. Saw a kerf ½ in. deep lengthwise, down the center; full length of the upper block.
4. Lay out lines ¼ in. on each side, and parallel to the kerf.
5. With a firmer chisel, cut out the V-shaped groove, shown in the illustration. The back of the hoe blade is placed in this groove.
6. Plane bevels on the upper block as shown in the end view.
7. In the center of the upper piece, saw out a notch 1 in. wide and 1½ in. deep. This is for the neck of the hoe.
8. Sand the project down for finishing.
9. Drill holes for 3-in. No. 10 f.h.b. screws.
10. Glue the blocks together, put in the screws, and place the whole in clamps.
11. Clean off surplus glue, when set, and paint the block with two coats of outside white paint so that the block will always be plainly visible.
12. If desired, a screw eye with a ring may be put in the end of the block, to facilitate carrying.

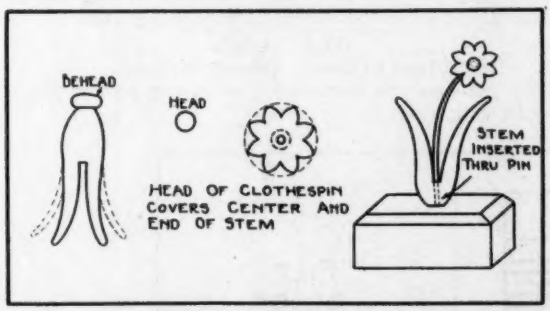
FLOWERS FROM CLOTHESPINS

Arthur West, Seguin Public School, Cincinnati, Ohio

The humble clothespin has finally blossomed forth as foliage to a graceful flower.

Take an ordinary clothespin, and remove its head with a coping saw. Soak the wooden pin in water, and spread the fork by means of a wedge. After it has dried, the leaves will remain outspread even after the wedge is removed. Drill a hole lengthwise through the center of the pin, and then fasten it with glue to a block of wood as shown in the accompanying illustration.

We are now ready for the flower, which is cut from a small piece of veneer or wallboard. Drill a hole through its center with the same size drill that was used for the hole through the clothespin. Dip the end of a heavy piece of reed in glue and insert it through the flower. The head which was cut off the



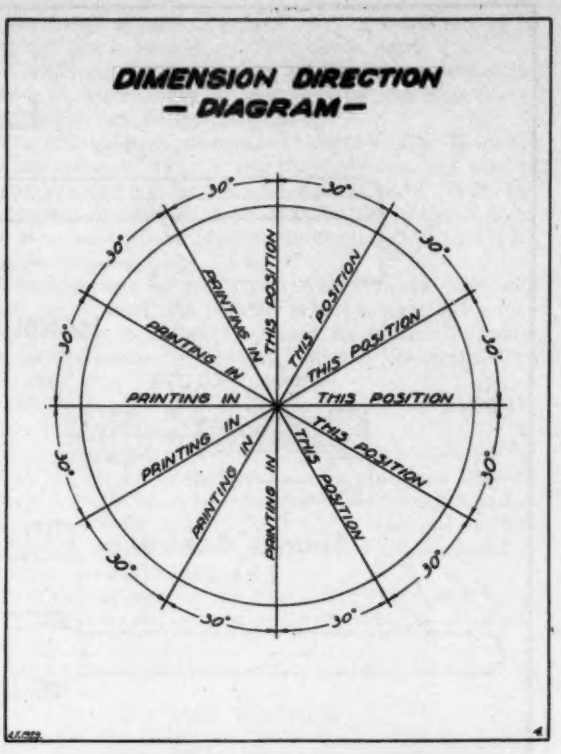
clothespin is then glued on as a center. When dry, dip the other end of the reed stem in glue and insert it in the neck of the clothespin. Paint the whole in pastel colors, and you have a simple yet colorful project that children will love. The project may be used either as an ornament or as a paper weight.

DIMENSION-DIRECTION DIAGRAM

August Flam, Manual Arts High School, Los Angeles, California

A common difficulty experienced by young draftsmen is that of determining how to face linear and angular dimensions where slating dimension lines are involved.

Authorities are quite generally agreed that dimensions should read from the bottom and from the right-hand side of the sheet. This rule is easily followed where all the dimensions



are located on horizontal or vertical, or nearly horizontal and nearly vertical lines, but this is not always the case.

By the use of the diagram shown herewith, any angular or linear dimension can be correctly placed without much trouble. The question has undoubtedly come up in mechanical-drawing classes why facing dimensions in a particular way should be so religiously adhered to. The pupil does not usually appreciate why it is preferable to have dimensions read from the right-hand side of the sheet, rather than from the left-hand side. There are two answers to this question. First, the method advocated is sanctioned by custom and good practice. It is in current use in up-to-date drafting and engineering offices. Second, it requires less craning of the neck, and less effort on the eyes than any other method yet tried.

The writer has, for the purpose of experimentation, drawn the same figure on two separate sheets of paper, and dimensioned it on one sheet so that the dimensions read from the right-hand side, and on the other, so that the dimensions read from the left-hand side. The class then found without a single dissenting voice that the one dimensioned to read from the right-hand side was *easier* and *more natural* to read than the other.

The effects of a demonstration of this sort seemed far more lasting than lecturing or showing on the blackboard.

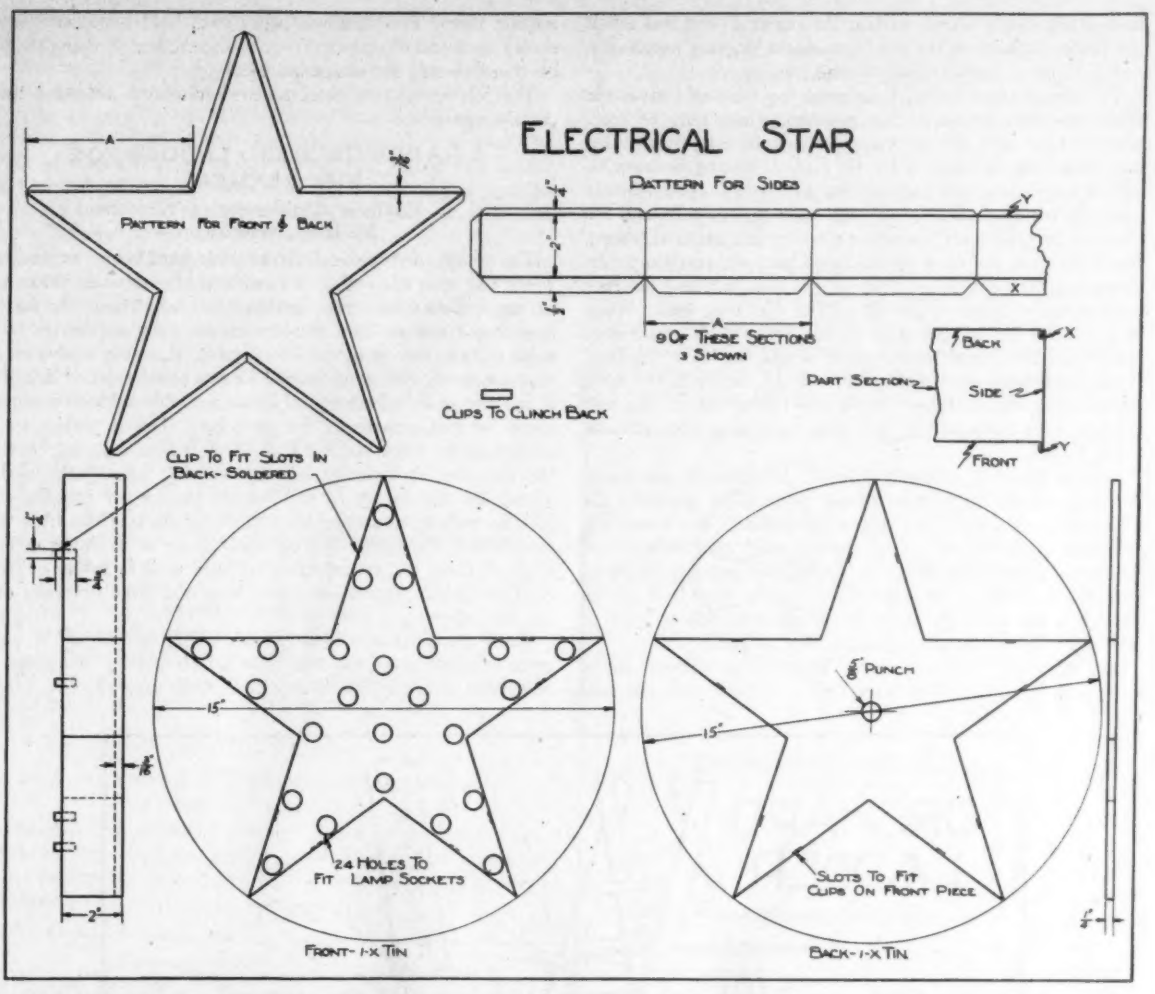
ELECTRIC STAR

Harry E. Anderson, Erie, Pennsylvania

The electric star shown in the accompanying drawings, makes an appropriate porch decoration for the Christmas holidays. It is designed for 24 lights or three strings of Christmas lights which can be purchased in any electrical-supply store. This star has been found interesting to the sheet-metal classes and is simple enough to be made in any industrial-arts class.

The construction of the star involves laying out, cutting, notching, folding, forming, punching, and soldering. The cash-box joint and lap joint are used.

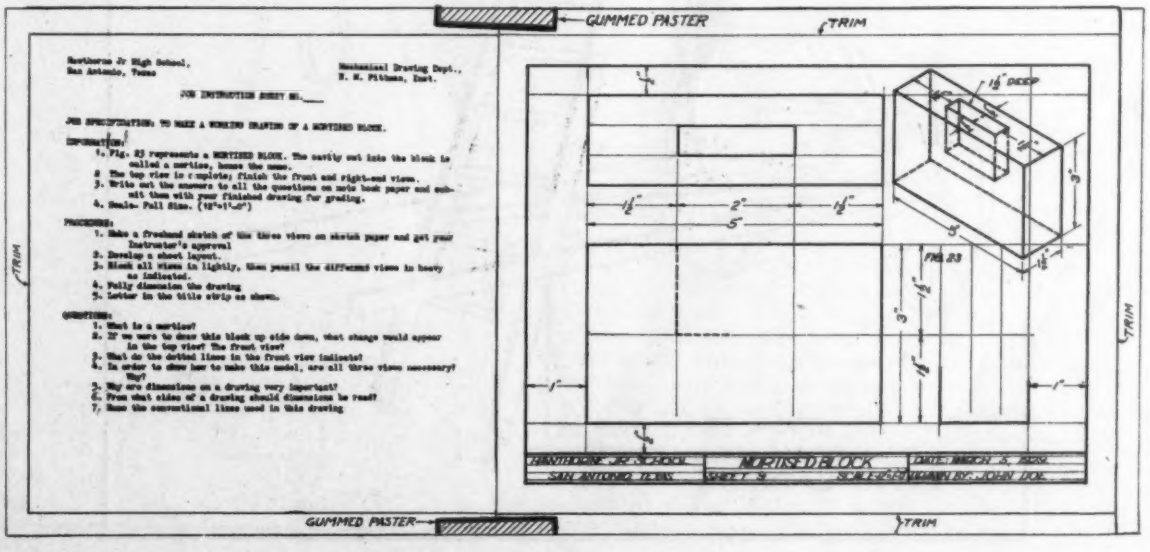
To finish the star, the Christmas colors of green and red should be used. The sheet metal might be painted green, while red electric bulbs could be used to give the contrast.



A NEW TYPE OF JOB INSTRUCTION SHEET FOR MECHANICAL DRAWING

N. M. Pittman, Hawthorne Junior High School, San Antonio, Texas

We all know that the chief difficulty encountered in the use of job instruction sheets is to get the student to read, understand, and follow the instructions that accompany the problem. I have tried various forms of instruction sheets in my mechanical-drawing classes and have found that any form that has to be unfolded, turned over or around, or in any way moved from the position in which the drawing is read, is undesirable. The average student will not take the trouble to read such


GUMMED PASTER
TRIM
Hawthorne Jr High School,
San Antonio, Texas
Mechanical Drawing Dept.,
N. M. Pittman, Inst.
JOB INSTRUCTION SHEET NO.___
JOB SPECIFICATION: TO MAKE A WORKING DRAWING OF A MORTISED BLOCK.
INFORMATION:
1. Fig. 23 represents a MORTISED BLOCK. The cavity cut into the block is called a mortise, hence the name.
2. The top view is complete; finish the front and right-end views.
3. Write out the answers to all the questions on note book paper and submit them with your finished drawing for grading.
4. Scale- Full Size. (12"=1'-0")
PROCEDURE:
1. Make a freehand sketch of the three views on sketch paper and get your Instructor's approval
2. Develop a sheet layout.
3. Block all views in lightly, then pencil the different views in heavy as indicated.
4. Fully dimension the drawing
5. Letter in the title strip as shown.
QUESTIONS:
1. What is a mortise?
2. If we were to draw this block up side down, what change would appear in the top view? The front view?
3. What do the dotted lines in the front view indicate?
4. In order to show how to make this model, are all three views necessary? Why?
5. Why are dimensions on a drawing very important?
6. From what sides of a drawing should dimensions be read?
7. Name the conventional lines used in this drawing
1½" DEEP
FIG. 23
HAWTHORNE JR. SCHOOL
SAN ANTONIO, TEXAS
MORTISED BLOCK
SHEET 3
DATE MARCH 5, 1930
SCALE-FULL SIZE
BY JOHN DOE
GUMMED PASTER
TRIM

instruction sheets before starting the drawing, and hence will not follow the steps in the procedure as the drawing progresses, and if he does, needless loss of time results.

To remedy these faults, I designed the form of instruction sheet described herewith. The problem, which may be complete or have only one or two views complete, is drawn upon our standard-size sheet, 8 by 10½ in. A tracing is made of the problem, and the instructions are typed upon another piece of tracing paper. This second sheet is 8 by 8 in. and fits easily in the typewriter. One must use the same grade of tracing paper for each, and back up the typed part with carbon paper. These tracings are placed end to end and fastened together with gummed stickers placed outside the trim lines. When blue-printed, the two parts are on one whole sheet, which does away with the trouble and expense of binding them together. Also, the drawing and instructions can be read from the same side of the sheet. These sheets are folded where the two tracings were fastened together, thus measuring 8 by 10½ in. when folded.

I have found it advisable to bind the different job sheets for each grade together into book form. This prevents the sheets from getting mixed in the file cabinet. The sheets are punched while folded, reenforcements used, and fastened together with loose-leaf notebook rings. Revisions may be made, new sheets inserted, and each sheet may be read as easily as though it were a single sheet. The student is able to refer to any sheet in the course without leaving his desk.

Our drawing desks are equipped with two vertical pieces about 14 in. long at the front with a 3/16-in. iron rod connecting them. Two common paper clips hold the instruction sheets open and directly in front of the student, keeping them off the desk and out of the way.

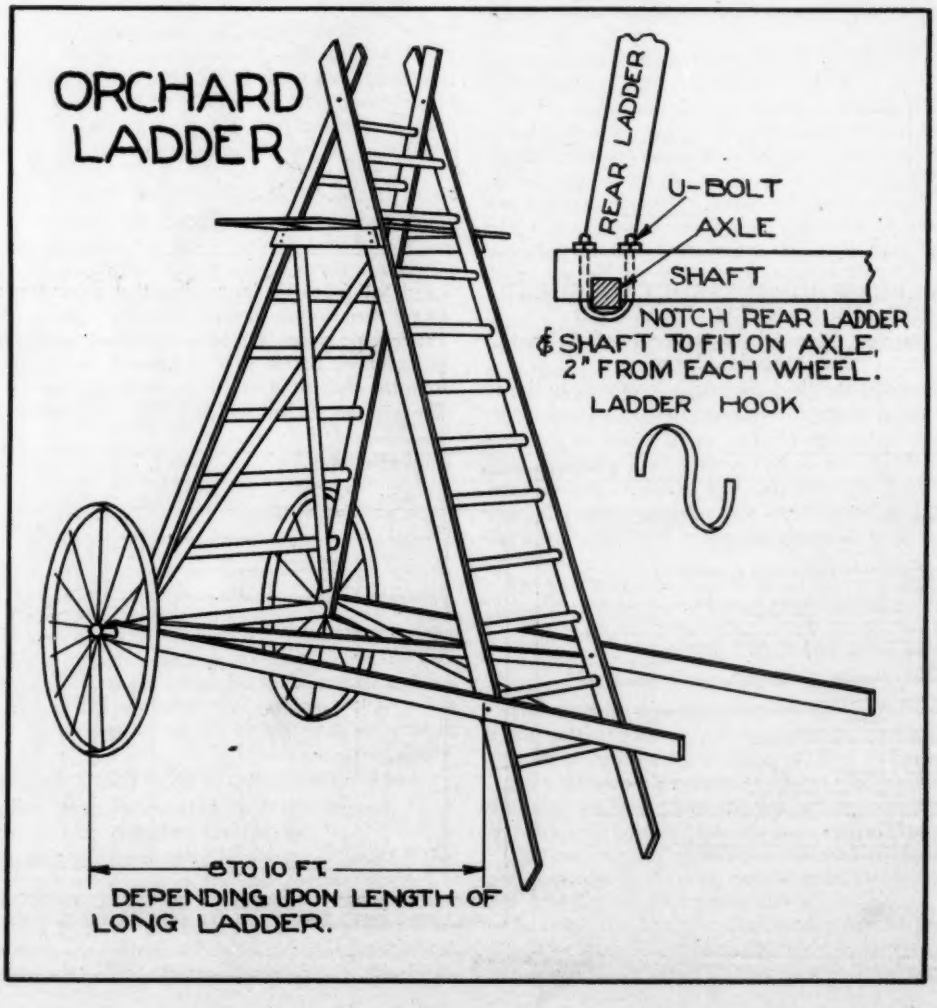
The job instruction sheet shown herewith is intended for the sixth grade.

A HANDY ORCHARD LADDER FOR THE FARMER

C. L. Kuehner, University of Wisconsin, Madison, Wisconsin

The accompanying sketch shows an orchard ladder on wheels which has been adopted by a considerable number of Wisconsin orchardists whose trees are large and tall. Those who have never used one of these ladders cannot fully appreciate the value of this piece of orchard equipment. It is ever ready, very easy to move, and more safe than any other type of ladder. It has the added advantage of being a double ladder affording room for two persons at the same time. This is particularly advantageous when picking fruit. This ladder does not break the branches as ordinary ladders do when improperly used. It enables one to get to any outside branch for pruning or picking without damaging the branch or shaking the fruit to the ground. The ladder will be found as useful in thinning the fruit on those big, tall, overloaded trees as it is handy in the work of detail pruning on the ends of the large branches of the old tall trees.

There are other uses to which this ladder can be put. It will come in handy about the house and barn in placing and removing storm windows and screens, cleaning eave troughs, bird



houses, and in other jobs which require the use of a safe ladder.

It is easily built. Any farmer can make it out of materials which he has on the place. Two discarded but sound buggy wheels, on an axle, can still be found behind the wagon shed on almost any farm. The framework and the ladder should be built of strong, straight-grain lumber, well nailed and bolted and braced. The platform near the top should be large enough to hold a half-bushel picking basket on each side of the ladder. While picking the fruit on the lower branches, the ladder hook will serve to hold the picking basket where it will be most convenient for the picker.

The slant or incline of the ladder must be steep enough so that anyone working on it, can rest his knees against the round or step next above the one on which his feet are resting. This will make it possible to use both hands at the job and serve to brace the body while standing on the ladder.

Bill of Material

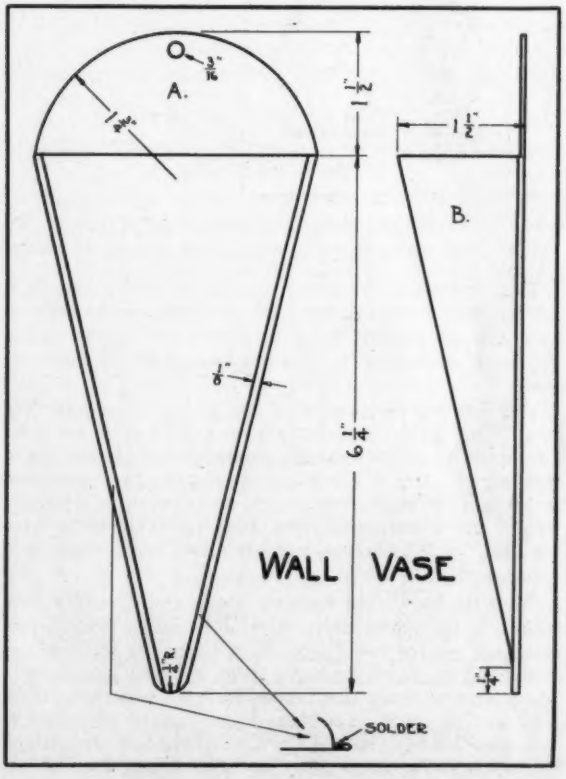
4 pc.	1 x 3 x 8	Braces
2 pc.	2 x 4 x 10	Rear Ladder
2 pc.	2 x 4 x 12	Shafts
1 pc.	1 x 12	Scrap iron for ladder hook for basket
6	⅜ x 4	Bolts
2	3½-in. U clips	
2	Strong buggy wheels on axle or shaft	
1	qt. white lead paint	
16- or 18-ft. barn ladder or stepladder		

The basket platform should project about 18 in. beyond the ladder. It may be made of ⅞-in. scrap lumber.

WALL VASE

C. R. Townsend, O'Keefe Junior High School, Atlanta, Georgia

The wall vase described herewith is one of the projects in which the beginners are greatly interested, and it covers a great number of operations with which he must become familiar.



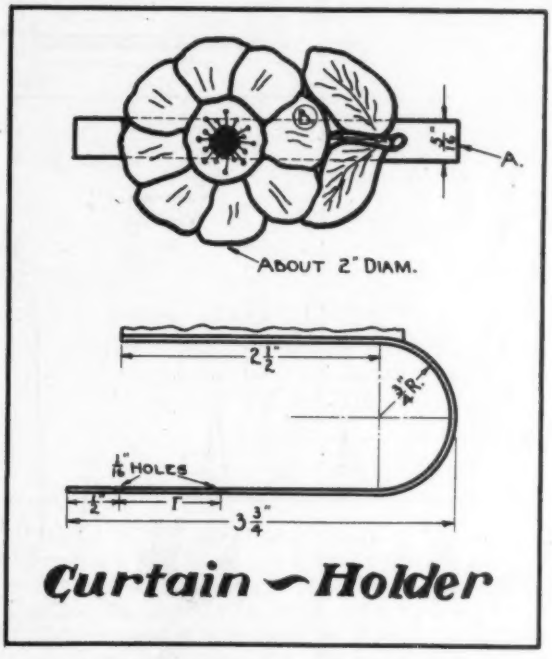
Operations:

1. Transferring the pattern.
2. Cut on straight and curved lines.
3. Fold hem on A all the way over.
4. Fold hem on B halfway over.
5. Shape B on blow-horn stake.
6. Assemble.
7. Solder so that vase is able to hold water.
8. Round up all outside edges.
9. Punch hole in top.
10. Paint and decorate as desired.

CURTAIN HOLDER

Stanley Bowen, Salem, New Jersey

The holder described herewith is an ideal project for beginners in metal work. The design is cut out of fairly heavy sheet iron or brass. All edges are filed smooth before the finish



is applied. In finishing it is well to select the color design of a flower, such as a pansy. When these holders are used in place of the customary ruffle, they lend a touch of color to the room.

ART-METAL PROBLEMS FOR THE JUNIOR HIGH SCHOOL

Kenneth B. Marsh, Lincoln Junior High School, Jamestown, New York

Articles made of hammered brass or copper have an appeal to almost everyone. They represent age and value to all classes, from the sixth-grade student to the most learned scholar.

Many articles of brass and copper can be produced in the junior-high-school metal shop with a minimum of labor and expense. When completed they have real value. Material which costs from 40 to 50 cents can in an hour or two be turned into a pair of book ends, which compare favorably with similar articles sold in art stores for 4 to 6 dollars. Other articles, such as candlesticks, stationery holders, pencil trays, and paper knives also can be made.

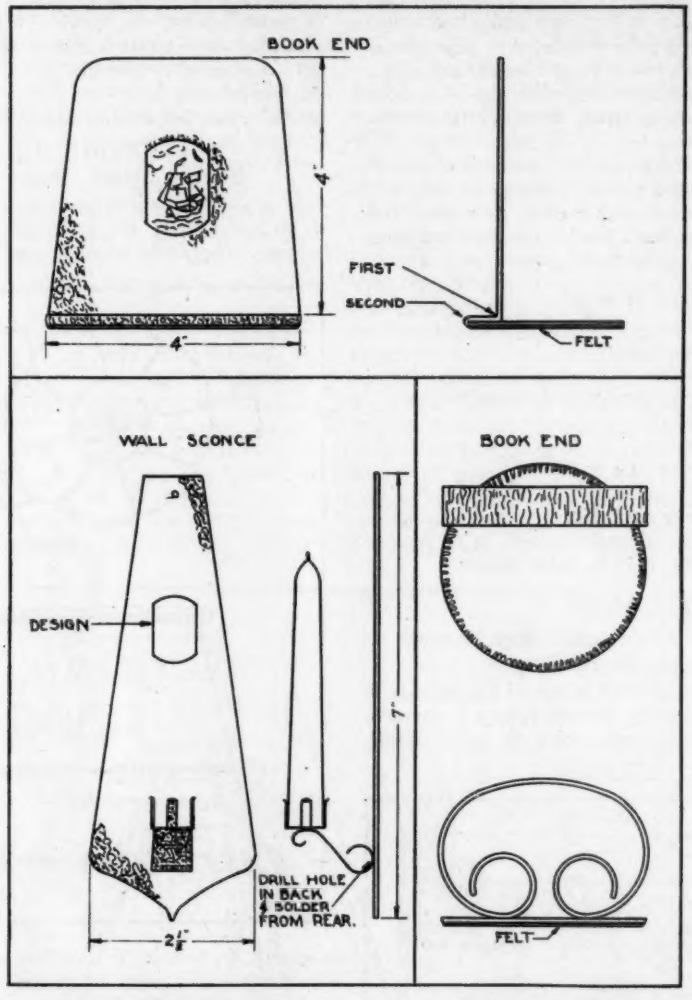
The materials required for making a pair of book ends are: two pieces of 18-gauge soft brass 4 by 7 in.; two metal seals for decoration; one piece of thin felt 4 by 6 in.; some fine steel wool for polishing; shellac for fastening the felt to the bottoms; and metal lacquer to prevent tarnishing. Tools required: pencil; snips; file; small ball-peen hammer; steel

block; mallet; bench brake; and a camel's hair brush for applying the lacquer.

Procedure:

1. Have each boy develop a pattern for his book ends on a piece of heavy paper, the pattern not to exceed 4 by 4 in.

The metal seals used for decoration can be purchased in most stationery stores. They can be had in a variety of forms; ships, flowers, initials, etc. Many are colored, but the coloring can be removed by applying lacquer thinner and wiping off with a cloth.



2. Four inches from one end of each piece of brass draw a line, this line to be at right angles with the sides.
3. Place the cut-out pattern with its bottom on the line and trace around it.
4. Cut out with snips.
5. True up the edges with a file.
6. Select the best surface and polish.
7. Lay out a space for the design.
8. Place on the steel block and hammer with the ball-peen hammer. Hammer the outer edge first, then around where the design is to be placed, and last, fill in the vacant space, being careful to strike all blows from the same direction and with equal force.
9. Lay the sheet brass face down on the bench and straighten with the mallet.
10. Bend the base end to a right angle in the brake on the straight line first drawn.
11. Turn the piece over and insert the small end in the brake ½ in. from the first bend and turn back as far as it will go, then pinch together.
12. Polish again with steel wool.
13. Fasten the metal seals in place.
14. Coat the surface with metal lacquer.
15. Stick the felt to the bottom with shellac.

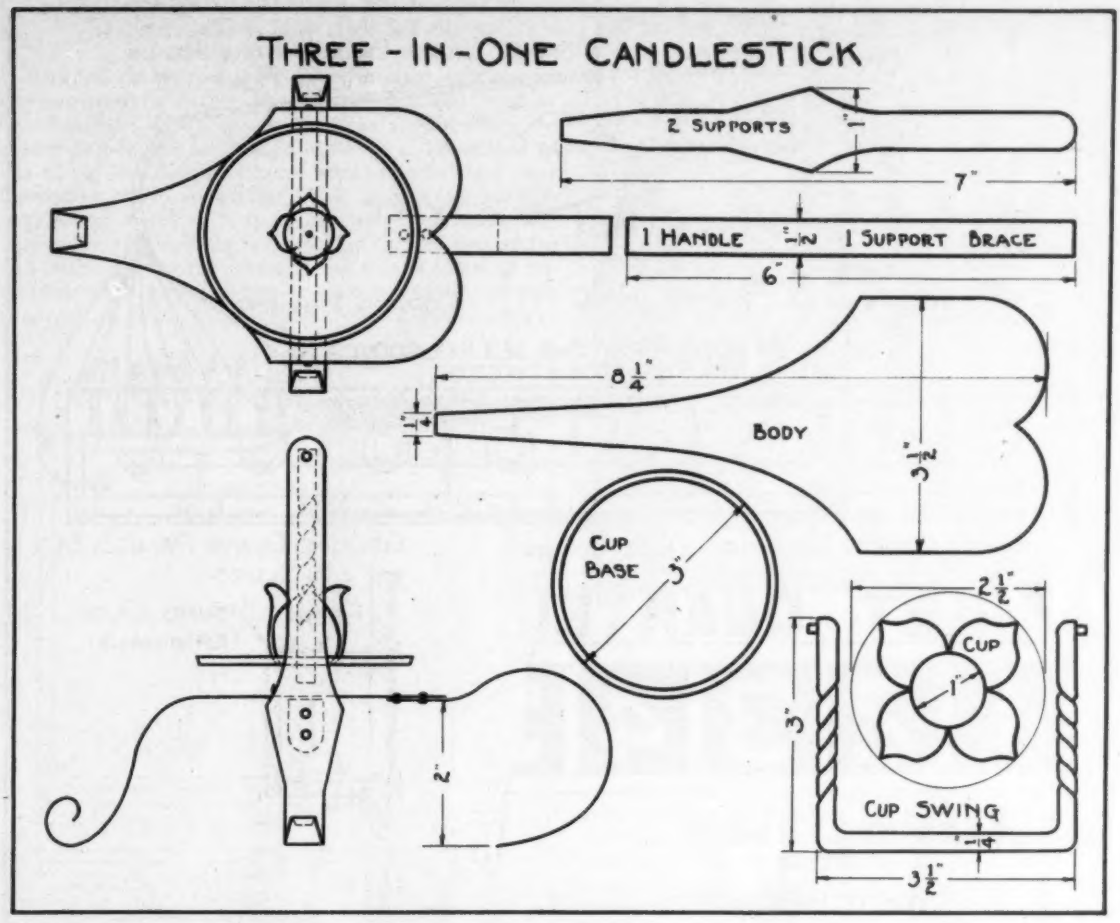
THREE-IN-ONE CANDLESTICK

J. W. Bollinger, Tulsa, Oklahoma

This candlestick is called a three-in-one holder because it can be either carried in the hand, set down on the table or mantel, or hung up on the wall to serve as a candle sconce. Pupils are interested in this problem, chiefly because "it works."

This article is to be made of No. 24 soft sheet iron. The "cup swing" on the drawing calls for a piece of ¼ by ¼-in. mild steel; it can just as well be made out of a piece of heavy wire, say No. 2 or 3. The advantage of using the square iron is that it can be readily twisted cold with the help of a monkey wrench and a machinist's vise. After the other pieces have been cut, cover them with hammer marks made with a ball-peen hammer.

Shape the body; then shape the handle and rivet it in place with 1-lb. black iron rivets. Rivet the support brace to the body, and put the swing supports in place. The cup base can best be shaped over a conductor stake, or over a specially prepared piece of wood. Only about ⅛ in. of material is to be bent up. The cup is to be shaped over the end of a piece of 1-in. round cold-rolled steel. The cup and cup base are fastened to the cup swing with a ½ by ⅛-in. black-iron rivet.



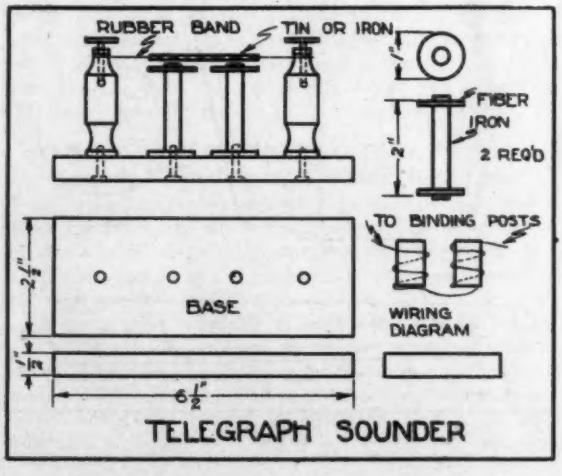
Polish the job with emery cloth to bring out the high lights, and then give the whole job a coat of clear lacquer, to obtain the natural iron finish so desirable for a piece of this kind.

TELEGRAPH SOUNDER

Carl v. Lindeman, Western State Teachers College, Paw Paw, Michigan

A very simple yet very attractive problem in electricity, is the making of an electrical telegraph sounder. Boys like to make this project, as it is something which they can use.

The sounder shown herewith consists of a wood base 6½ by 2½ in., sanded, stained, and shellacked. The coil frames are made of a ¼-in. round soft iron, or if it is not possible to get iron, a piece of heavy wire will do. The fiber washers may be cut out of a piece of old radio panel. The holes in the center of these washers should be cut or bored slightly smaller than the iron core, so that they have to be forced on. Each coil is wound with ten feet of No. 24 S.C.C. wire. The sounder is made of a medium rubber band over which a piece of tin has been folded, as shown in the diagram. The two binding posts are placed on the base and fastened with screws from the bottom. The sounder is assembled and wired as shown in the wiring diagram. One dry cell is required to operate it.

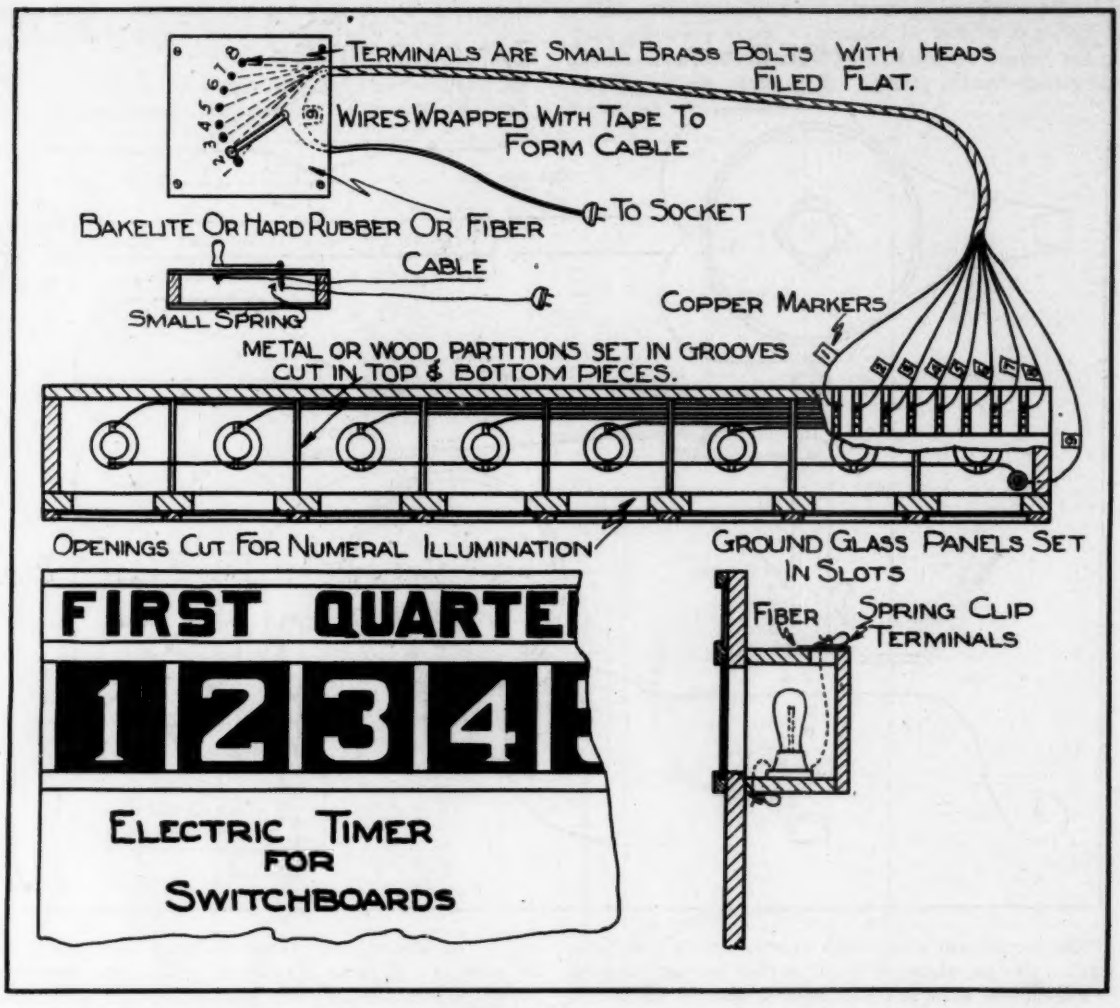


ELECTRIC TIMER FOR SCORE BOARDS

R. M. Hammes, Abraham Lincoln High School, Council Bluffs, Iowa

During the last basketball season we developed a device by which the audience was kept informed regarding time left to play in each quarter of the games. We found our patrons to be very enthusiastic over the device.

The construction may be of wood or sheet metal. The glass panels are about 6½ in. square; one side of the glass is ground and the numerals are formed by filling in all but the figures on the ground sides. The figures must be formed backward so as to be read correctly from the opposite side of the glass. Several coats of black laquer were used for filling in. The entire board was painted a dull black and the names of the teams, officials, quarters of the game, and numerals for scores, were painted in black on a white cardboard and slipped in special slots provided. The size of numerals can be made to meet any conditions, therefore no dimensions are shown on


TERMINALS ARE SMALL BRASS BOLTS WITH HEADS FILED FLAT.
WIRES WRAPPED WITH TAPE TO FORM CABLE
TO SOCKET
BAKELITE OR HARD RUBBER OR FIBER
CABLE
SMALL SPRING
COPPER MARKERS
METAL OR WOOD PARTITIONS SET IN GROOVES CUT IN TOP & BOTTOM PIECES.
OPENINGS CUT FOR NUMERAL ILLUMINATION
GROUND GLASS PANELS SET IN SLOTS
FIBER
SPRING CLIP TERMINALS
FIRST QUARTE
1 2 3 4
ELECTRIC TIMER FOR SWITCHBOARDS

the drawing. Lightproof compartments are formed by inserting partition panels of veneer or sheet metal in grooves cut for them.

In our gym an assistant timer manipulates the switch controlling the device, as he sits at the official's table. The cable, of course, must be made long enough to reach the table from the board. The extension cord, running from the switch box, must be of a length to reach the nearest plug. One of the wires from the plug is hooked up with No. 9 wire running from the parallel hook-up of the lamps, the other plug wire is hooked to the switch arm. Wires running from the lamps to the corresponding switch terminals are marked by small bands of copper upon which the numerals are stamped. The marked wires and spring-clip terminals enable disconnection when not in use.

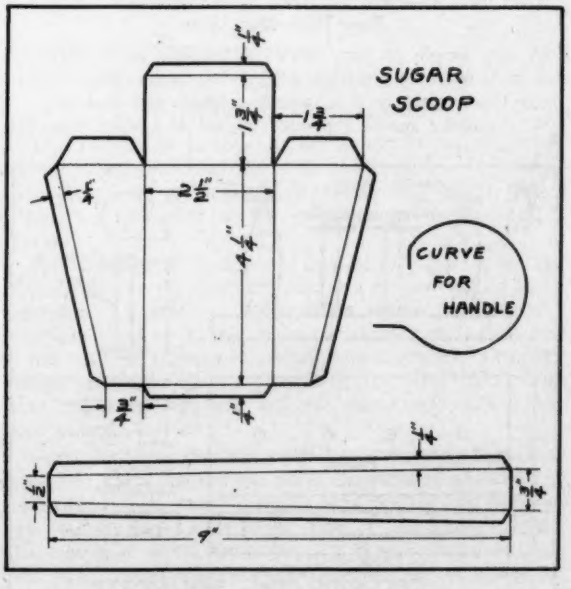
At the start of the game the lamp in box 8 is switched on and as the minutes pass, the time left to play is indicated by switching on the proper lamps, each switch terminal marked to show the proper lamp hook-up.

SUGAR SCOOP

J. W. Bollinger, Tulsa, Oklahoma

Here is an interesting problem for the beginnner. It also is a good piece of work with which to begin the year's work. It can be used to teach the elementary processes of cutting stock, laying out, hemming, bending, shaping, and riveting. The coke-tin blank measures 6½ by 6½ in.

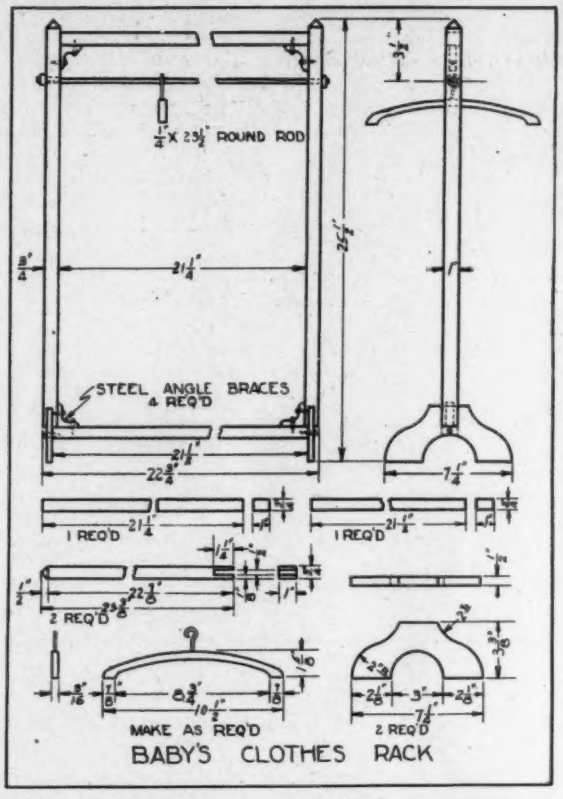
The finishing problem presents a pleasing appearance without requiring paints or other finish.



BABY'S CLOTHES RACK

John F. Jeffery, East High School,
Erie, Pennsylvania

The small clothes rack shown in the accompanying illustration is designed for storing away baby's clothes after they have been laundered. If the laundered articles are put away in a drawer or box, the one wanted is always at the bottom so that all the little dresses get more wrinkled and mussed every time baby's clothes are changed. With this rack no such difficulty exists. Moreover, it is not necessary to have clothing scattered about the home to "air" after ironing, because the rack itself cares for this process — but enough about the advantages of this project. If you have a baby you will recognize the advantages yourself, if you haven't, oh well, you just don't.



BABY'S CLOTHES RACK

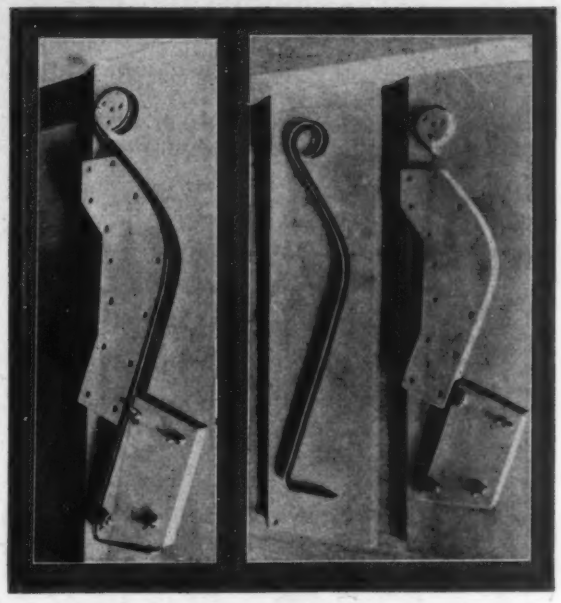
As for design, everything is of the simplest possible construction. There is not even a miter joint in the whole rack, and the entire thing can be assembled by driving only two or three brads. In finishing, a very pleasing result was obtained by using four different colors of brushing lacquer; i.e., red, blue, white, and buff. Additional ornaments in the form of spitting cats, roosting owls, etc., cut from plywood and mounted on the upper crossrail might be added very effectively.

JIG FOR BENDING END-TABLE LEGS

Kenneth L. McCulloch, Plainfield, New Jersey

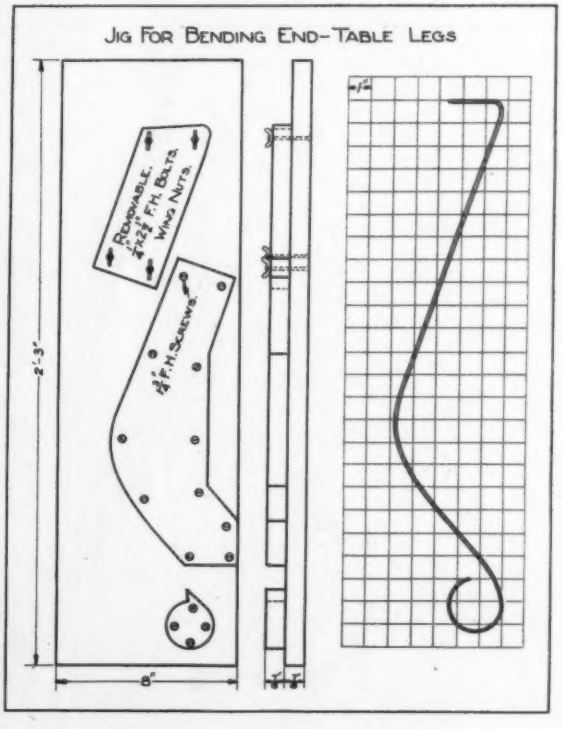
In the making of wrought-iron projects, especially those of ⅛-in. band iron, the writer has found that by using jigs, the duplicate parts can be made quite uniform. The jig shown in the drawing is one of a number which have been constructed and used successfully during the past year.

All parts are constructed of hard wood, usually birch or maple. Two of the parts are secured to the base with 1¾-in. screws and are so shaped that hand clamps may be applied at various points while the bending is being done. The third part is removable and secured in place by ¼-in. bolts with wing nuts.



BENDING JIG FOR TABLE LEGS

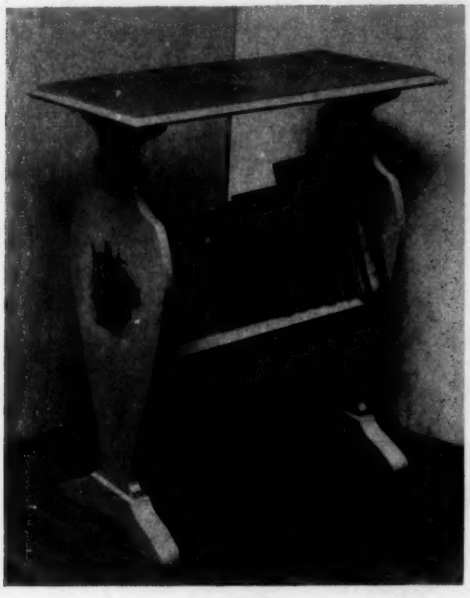
The leg, as designed, requires a piece of iron 33 in. long. The loop at the foot is first made by bending around a 1¼-in. pipe coupling. The loop is then placed over the circular part of the jig and the bending continued around the second part and held in place by hand clamps. The third part is replaced and the top of the leg bent to shape. Rivet and screw holes may be drilled either before or after bending. The positions of such holes can be marked on the jig so that all will correspond. As the iron springs back slightly after bending, all curves should be made so as to allow for this spring. The finished shape will then be according to the outline.



AN END TABLE

Jonathan Bright, Academy High School, Erie, Pennsylvania

In designing the table illustrated herewith, the aim was to create a project which, aside from being useful, would be durable and pleasing to the eye. The curves of the legs, were designed so as to give a balanced effect. The foot was added



END TABLE

primarily for strength and made to conform to the rest of the design. The trough for the books is substantial and allows an ordinary book to be held without projecting beyond the confines of the legs.

The construction is simple and may be varied to suit the ability of the boy. The joints may be mortised and tenoned, or doweled, or the pieces may be simply nailed and glued together. The top may be fastened with desk-top clips or by using the method shown in the drawing.

The finish may be natural (lacquered), or stained to imitate walnut or mahogany. If brushing lacquer is used, a transfer decoration may be added.

SPACING AND JUSTIFYING LINES OF TYPE

Dean W. Conner, Ralston Industrial School, Pittsburgh, Pennsylvania

In straight-matter composition the compositor generally starts out by placing a 3-em space after each word, except after a comma or a period that follows an abbreviation, in which case a space one size smaller is used. If the spacing between the words must be made smaller to get the last word or syllable in the line, some of the 3-em spaces are replaced by 4-em spaces. The shapes of the letters on either side of the spaces determine where the changes should be made. For example: More space can be placed between d and h, than between e and o without being noticed on the printed page.

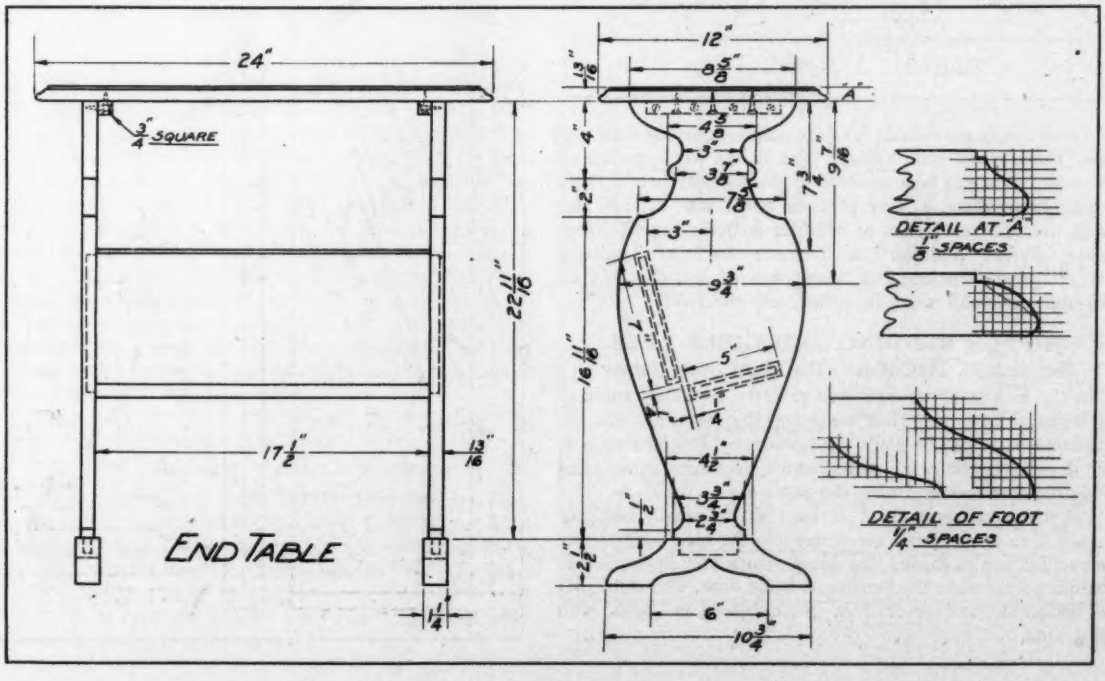
If the spacing needs to be made larger, the 3-em spaces should be replaced by en quads. If, in the last place that is to be made larger, an en quad is too large and the 3-em space is too small, a combination of spaces (two 5-em spaces or a 5-em and a 4-em space) may be used. A combination of spaces is usually required in but one place in the line. This not only saves time in distribution, but helps greatly in keeping the space boxes clean.

There is a tendency in many shops to use the 4-em space between the words. This, of course, should be determined by the style of type that is being used.

The accompanying table has been arranged to show, in points, the gradual increase of the spaces from the 5-em space up to two 3-em spaces.

All 2-point spaces have been indicated with boldface type, as it is frequently necessary to use a 2-point lead of other than standard pica length. This can be done by turning the 2-point spaces sideways at the end of a 2-point lead.

Point-set spaces differ from regular-set spaces. For example: A regular-set space is always a fractional part of the em. A 3-em space of 8-point type would be exactly three points thick. By referring to the table under 14 point it will be noticed that a 5-em and a 4-em space are the equivalent of seven points, while the en quad is also seven points thick, being one half a 14-point em.



A careful study of the table will reveal some interesting facts that are well to know when justifying lines of type that should be spaced properly.

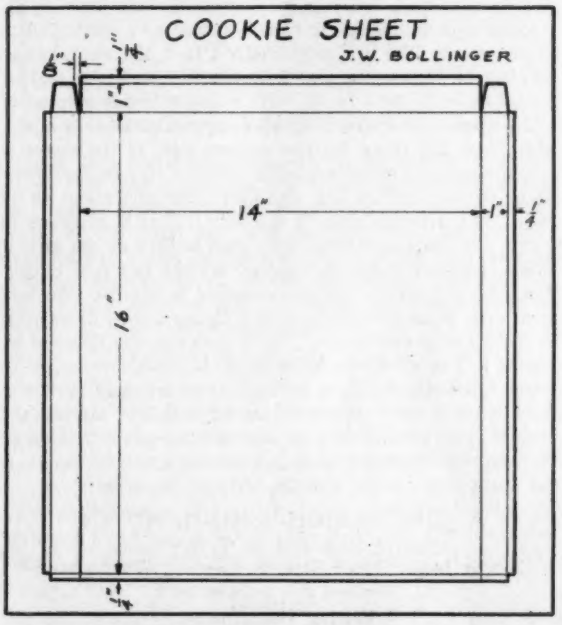
Table Showing Thickness in Points of Point-Set Spaces and Space Combinations

Name of Space	6 point	8 point	10 point	12 point	14 point
5-em	1¼	1½	2	2½	3
4-em	1½	2	2½	3	4
3-em	2	3	3½	4	5
5-em and 5-em	2½	3	4	5	6
5-em and 4-em	2¾	3½	4½	5½	7
en quad	3	4	5	6	7
3-em and 5-em	3¼	4½	5½	6½	8
3-em and 4-em	3½	5	6	7	9
3-em and 3-em	4	6	7	8	10

COOKIE SHEET

J. W. Bollinger, Tulsa, Oklahoma

Most boys like to eat cookies and will, therefore, be interested in making the cookie sheet. The pan should be made to fit the oven; common sizes of ovens are 12 by 14, 14 by 16, and 16 by 18 in. The IX tin for the pan shown in the drawing measures 16½ by 17½ in. The side is left off the front of the pan, to make it possible to slide the cookies off easily. The two corners must be riveted.



The job appeals to the lad as a "filler-in" job while he is making up his mind which project he will make next.

CARE OF GLUING CLAMPS

V. C. Darby, Cedar Rapids, Iowa

The clamp is one item of shop equipment that does not often receive the care it deserves. It is, of course, a rough piece of equipment, and although requiring little attention, a thorough going-over and cleaning up the clamp equipment once a year, will materially increase its life of usefulness.

When in use, glue is frequently spilled on the clamps. The moisture of the glue, coming in direct contact with the metal parts of the clamp, invariably causes rust. These rust spots are too inconspicuous to attract attention at first, but in the course of a few years they corrode the metal to a considerable depth, and as a result, the strength of the clamp is seriously impaired. The glue and dirt should therefore be removed with a stiff wire brush, taking away at the same time all rust and scale. Then apply a coat or two of good waterproof paint, preferably a paint prepared for metal surfaces. A good aluminum bronze is to be recommended in this connection.

The screw and nut on the clamp also should be given an application of oil or grease once a year. Automobile transmission grease is excellent for this purpose. The lubricant should be applied lightly, however, as a surplus amount will only collect dust and dirt.

Wood clamps should be cleaned, the threads and nuts lubricated, and a liberal coat of linseed oil applied to the wood parts. This will help prevent the checking and cracking that so often ruins wood clamps.

A SIGN FLASHER

Victor Rimsha, Chicago, Illinois

The problem herewith described may be made a cooperative enterprise between the pattern shop, drafting room, foundry, machine shop, sheet-metal shop, and electrical shop, or all of it may be made in one shop thus, presenting a good project for a general shop.

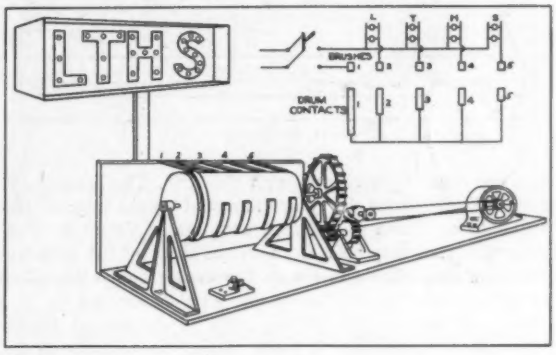


FIG. 1

The flasher consists of a cylinder 6 in. in diamater, 10½ in. long. This may be glued up of several pieces of wood. On the cylinder are mounted five copper strips which are fastened to the cylinder with fine nails. The strips are all electrically connected together by a wire running through beneath all of the strips and soldered to each one. One of the strips is continuous and always connects to one side of the power line through brush No. 1. The other four strips are of various lengths, causing their particular light to flash only

FIG. 4 AND FIG. 5

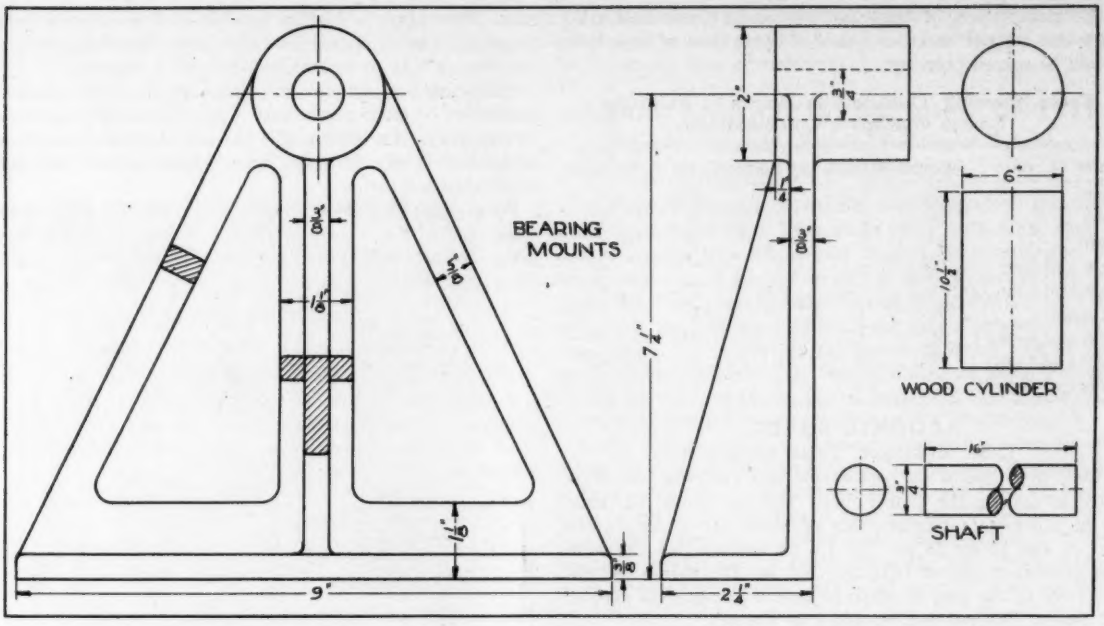


FIG. 2

while the brush is in contact with the strip. The brushes are made of spring brass. They are mounted on the edge of the backboard as shown in Figure 1 and also in Figure 4. They are bent so that they bear down on the strips of the cylinder. The ¾-in. shaft shown in Figure 2 extends through the cylinder with about 4 in. of it extending on the gear end.

The shaft turns in two bearings made of white metal. Figure 2 shows how this bearing is made. A gear is mounted on the end of the shaft which extends 4 in. beyond the wood cylinder. The pinion with which this gear measures is mounted on a worm gear unit which in turn is belted to a small ½-h.p. electric motor. The belt reduction is 1 to 2, the worm reduction is 1 to 12, and the gear reduction is 1 to 3, this making a total reduction of 1 to 72. With a motor having a speed of 1,725 r.p.m. the cylinder speed is approximately 24 r.p.m, which is a fair speed for the average sign. If the motor is geared down still lower, a smaller cylinder may be used, thus giving the same effect. The sign board measures about 12 by 36 in. On it are displayed the 4 letters L T H S, as shown in Figure 5. From 4 to 9 lamps were used to light up the various letters. Figure 1 shows the diagram for the electrical circuit. The lights for each letter are connected in parallel. One wire from each letter is connected to a common wire which runs to the other power terminal, as is shown in the diagram on Figure 1. The spare wire from letter L is then connected to brush 2, from letter T to brush 3, from letter H to 4, and from letter S to 5. When the motor is set in motion, the brushes make contact with the various strips, thus flashing on the lights in the individual letters for the length of time that the brush is in contact with the strip on the drum.

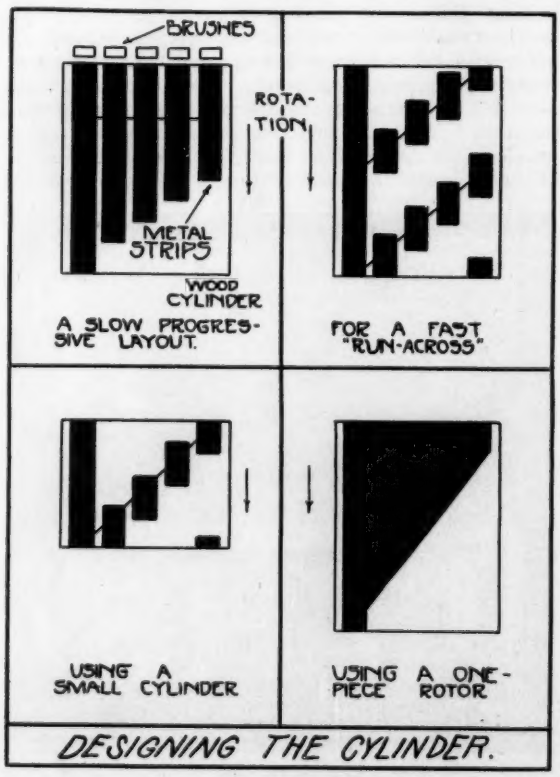


FIG. 3. ALTERNATIVE CYLINDER DESIGNS

A JUNIOR-HIGH-SCHOOL MOTOR

Charles Rice and E. T. Williams,
North Junior High School, Everett, Washington

(Continued from December issue)

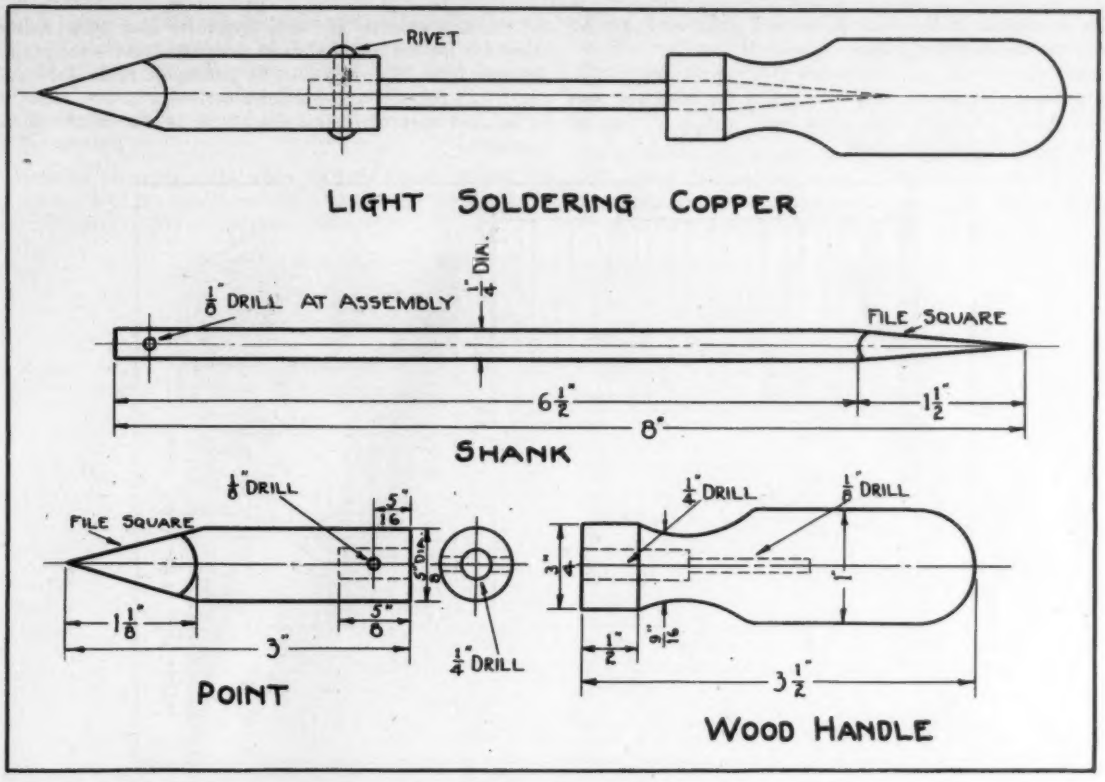
Wiring Description

The two leads from each pole winding of the armature are arranged so that the last lead of one pole is fastened to the first lead of the next, and these in turn are soldered to the commutator segments. The leads that are fastened together will be the ends that come out between each pole. If they are soldered to the nearest segment, the brushes will ride on the sides of the commutator. The exact position for best results can be found by experiment.

All the connections of the motor are in series, that is, the current runs through the winding of a field pole to a brush where it proceeds through a binding of the armature and out to the second brush, and then through the second pole winding. The power wires are connected to the two remaining leads from the field coils. The field poles must be of opposite polarity.

The Brushes

The brushes are 3/16 in. or ¼ in. in width, preferably made of bronze, although copper or brass will do. They are



screwed to a block which in turn is fastened to the base board. They can be bent to ride on the commutator at the best running position. Carbon brushes did not prove as successful as the metal ones because they would not ride the irregularities of the commutator so well. No set design is given for the base of the motor. The motor speed may be reduced by a series of gears, or it may be controlled by a rheostat, or it may drive a fan direct.

LIGHT SOLDERING COPPER

Alfred Grayshon, Jay Cooke Junior High School, Philadelphia, Pennsylvania

Cheap soldering tools can be bought in the 5 and 10 cent stores. They are usually made of brass, which will burn if they are allowed to become overheated.

The accompanying illustration shows a small soldering copper, which any boy can easily make as a project in the metal shop. It is durable and very handy for soldering small work, such as radio work.

Material

1 pc.	⅝ Dia. x 3⅛	Copper point
1 pc.	¼ Dia. x 8	Cold-rolled steel shank
1 pc.	1 x 1 x 3⅝	Wood handle

Operations

Point

1. Cut stock to size.
2. Square up the point.
3. Chuck in the lathe and face the end.
4. Spot center with facing tool and drill the hole.
5. Drill the small hole using a V Block to support the work.

Shank

1. Cut the stock to size.
2. File the point square.

Handle

1. Procure a piece of suitable wood.
2. Center and turn.
3. Drill the proper holes or burn the hole in with a tang of an old file.

Assembly

1. Fit the shank in the hole of the point.
2. Drill through and rivet.
3. Hammer the copper tight around the hole.
4. Place the handle on the shank.

Remarks

1. The copper may be heated red-hot and the point forged to the correct shape if the shop has the facilities for this kind of work.

2. Threads may be cut on the shank so that it may be screwed into the copper, instead of riveting the two together, but there is a big possibility that the boy will break the tap in the copper.

DOLL BED

Armand J. La Berge, Bryant Junior High School, Minneapolis, Minnesota

A doll bed delights the heart of any little girl and is sure to give endless pleasure to the owner of such a plaything.

Any soft wood, such as white pine, bass, or butternut, may be used in the construction of this problem.

Bill of Material

2 pc.	⅞ x ⅞ x 13	Head Posts A
2 pc.	⅞ x ⅞ x 10	Foot Posts A
2 pc.	½ x 1½ x 8	Top End Rails B
2 pc.	½ x 1¾ x 9	Bottom End Rails C
2 pc.	½ x 1¾ x 20	Side Rails D
1 pc.	½ x 3 x 7⅜	Head End Panel E
2 pc.	½ x 1¼ x 7⅜	Head End Panels F
1 pc.	½ x 3 x 4⅜	Foot End Panel G
2 pc.	½ x 1¼ x 4⅜	Foot End Panels H
11 pc.	½ x 1¼ x 9⅜	Slats I

The illustration and bill of material show clearly the construction details. However, the main thing to keep in mind when making the different parts of the bed is to see that the parts are cut the right size and have the ends of each part square.

A miter saw and box should be used for cutting the ends of all parts. A small wooden miter box can be constructed in a

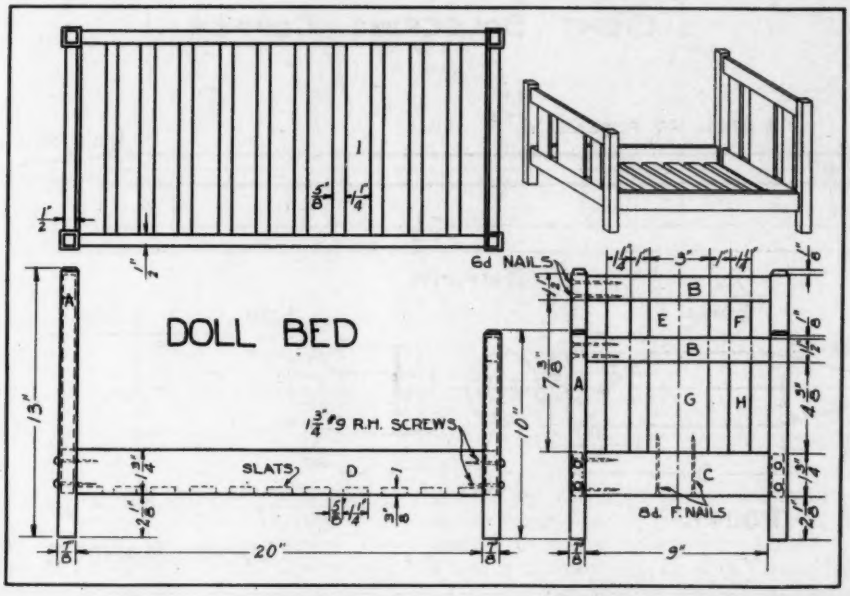
very short time, if the usual miter box is not at hand. All joints are common butt joints.

Assembling

The top end crossrails B are nailed to the head and foot panels with 6d finished nails. Bore holes with a 1/16-in. bit in the crossrails before nailing.

Although enamels are more expensive than most finishes, they are far the best and most desirable finishes for projects of this type. They can also be purchased ready for use in nearly all colors in any size container.

Lacquer may also be used with the best of results on this problem.



In a like manner, nail lower crossrails C to B, G, F, and H with 8d finishing nails.

Attach the posts to cross rails B and C with 6d finishing nails and glue.

Fasten the side rails D to the head and foot of the bed with 1¾-in. No. 9 r.h. screws.

Finishing

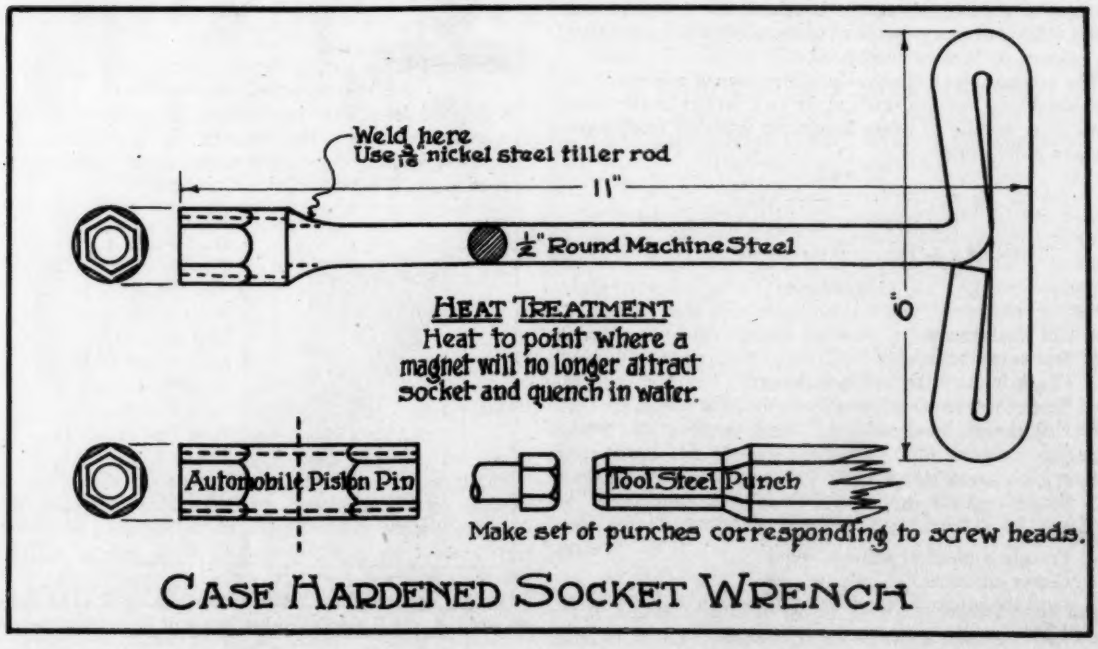
A very lasting and desirable finish may be obtained by using a simple gloss outside paint. There are many good brands of common house paint on the market that can be obtained in different colors in small-size cans.

CASEHARDENED SOCKET WRENCH

R. F. Jennings, South High School,
Minneapolis, Minnesota

In one of the automobile factories, socket wrenches for use on the assembly floor, are made by the toolmakers out of old piston pins. The material used in piston pins is a high-grade alloy steel and is deeply casehardened. Sockets made from them and properly hardened, withstand almost unbelievable abuse.

The socket wrench shown is of the T-handle type, but also can be made in the form of an L- or speed-type wrenches.


Weld here
Use 3/16" nickel steel filler rod
11"
½" Round Machine Steel
6"
HEAT TREATMENT
Heat to point where a magnet will no longer attract socket and quench in water.
Automobile Piston Pin
Tool Steel Punch
Make set of punches corresponding to screw heads.
CASE HARDENED SOCKET WRENCH

One piston pin will usually make two sockets. The punch, which is made the exact size of the cap-screw head the socket is to fit, is driven into the piston pin which has been previously heated to a red heat. After forming both ends, the piston pin can be sawed in two and the sockets oxyacetylene welded to the handles.

Some of the most useful sizes for automobile use are: ¾ in., ⅝ in., 9/16 in., and ½ in., which fit ½-in., 7/16-in., ⅜-in., and 5/16-in. cap screws and nuts respectively.

Then the second die was cut from that pattern. With the border cut so as to leave a bleeding edge, the appearance of the entire job was very attractive.

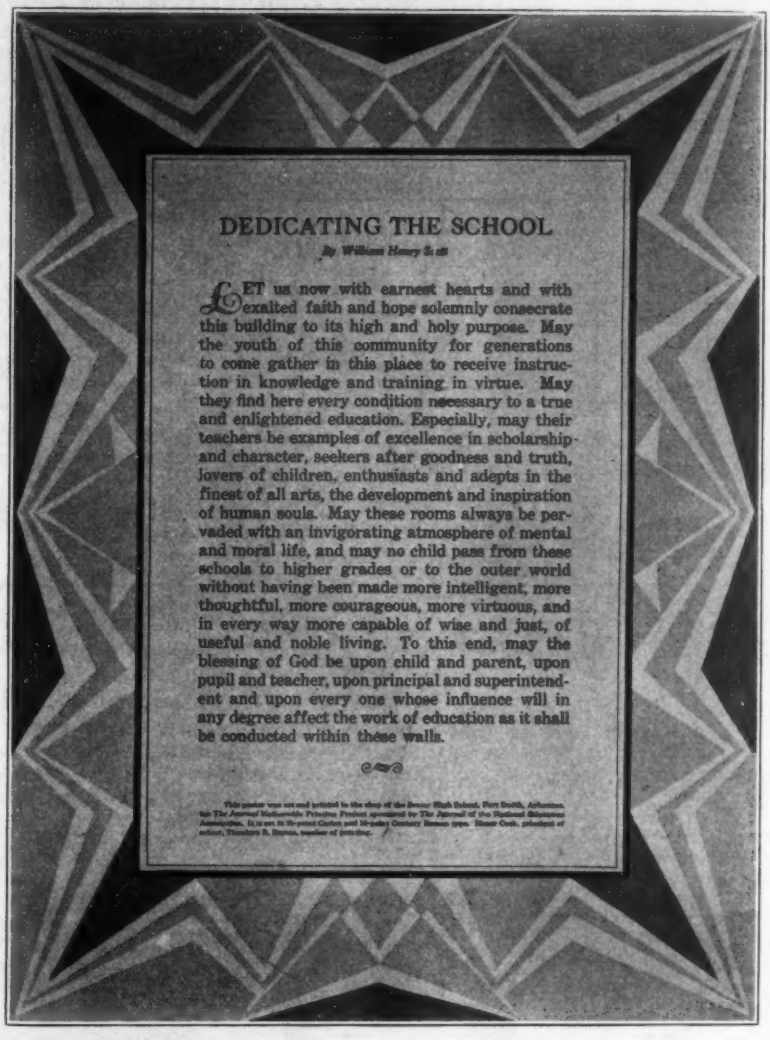
THE USE OF PHILIPPINE MAHOGANY IN 1929

The importation of Philippine lumber into the United States during the second quarter of 1929 aggregated 11,190,728 board feet, exclusive of 2,584,529 superficial feet of plywood, according to a recent report. The average monthly receipts for the second quarter of the current year amounted to 3,370,000 board feet, as against 2,400,000 board feet for the first quarter. This represents an increase of approximately 50 per cent. The monthly receipts of the second quarter represented an increase of 24 per cent over the monthly rating established by the Philippine shippers in January, and about 24 per cent over the monthly average for 1928.

Of the total importations of light and dark mahogany woods, it is interesting to note that 8,730,979 board feet were received at Pacific Coast ports, and 2,459,749 board feet, or 22 per cent at Atlantic Coast ports.

The total amount of plywood received during the second quarter of 1929 was 2,584,528. This was 10 per cent more than was received during the first quarter. The larger part of the plywood stocks were received through Pacific Coast ports.

During the first half of 1929, the total quantity of Philippine lumber amounted to 18,336,733 board feet, and the plywood amounted to 4,929,200 superficial feet.


DEDICATING THE SCHOOL

By William Henry Scott

LET us now with earnest hearts and with exalted faith and hope solemnly consecrate this building to its high and holy purpose. May the youth of this community for generations to come gather in this place to receive instruction in knowledge and training in virtue. May they find here every condition necessary to a true and enlightened education. Especially, may their teachers be examples of excellence in scholarship and character, seekers after goodness and truth, lovers of children, enthusiasts and adepts in the finest of all arts, the development and inspiration of human souls. May these rooms always be pervaded with an invigorating atmosphere of mental and moral life, and may no child pass from these schools to higher grades or to the outer world without having been made more intelligent, more thoughtful, more courageous, more virtuous, and in every way more capable of wise and just, of useful and noble living. To this end, may the blessing of God be upon child and parent, upon pupil and teacher, upon principal and superintendent and upon every one whose influence will in any degree affect the work of education as it shall be conducted within these walls.

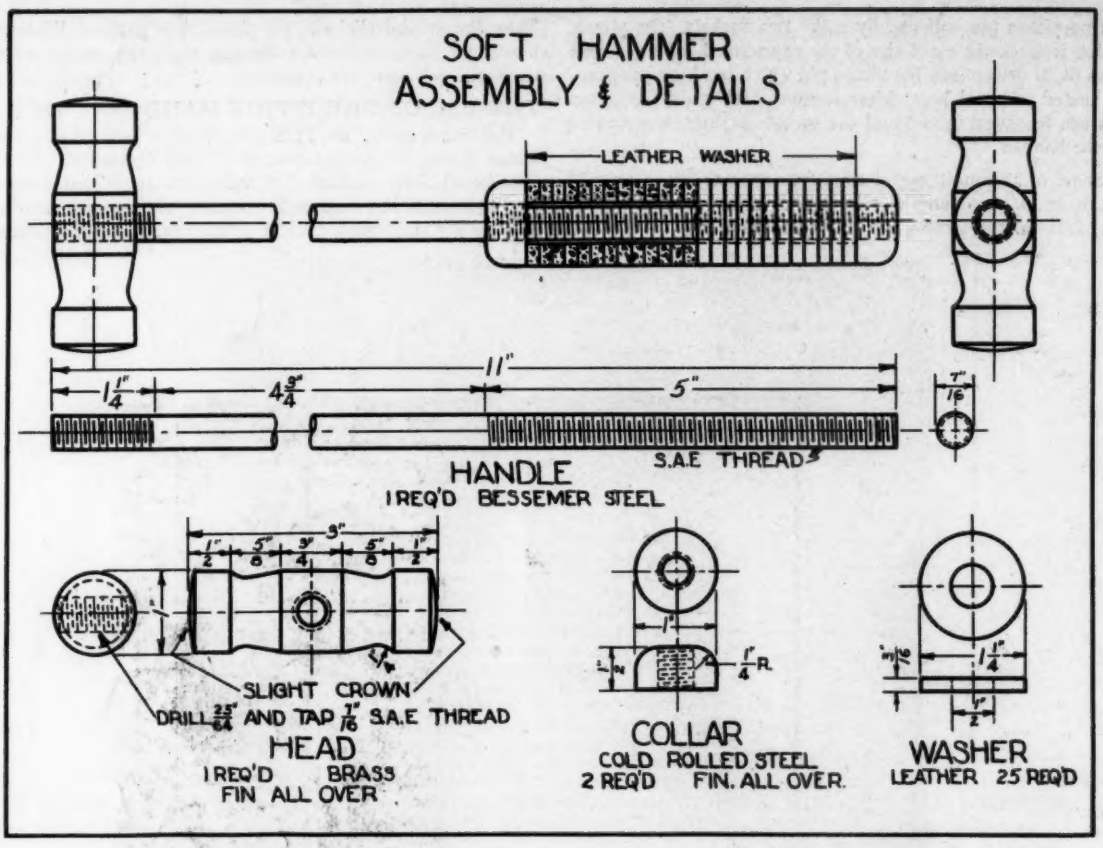
A PRINTING PROJECT

F. M. Keith, Senior High School,
Fort Smith, Arkansas

The poster shown herewith was printed by the pupils of the senior high school, at Fort Smith, Arkansas, for the nation-wide printing project which was conducted last spring by the journal of the National Education Association.

The job was done in four colors on white blotting paper which gave it a soft-toned appearance that no other kind of paper would give. The heading was set in 18-point Caslon and the body in 14-point Century. The type matter, with the 6-point mitered rule, was printed in black. The Caslon initial and ornament, together with the hair-line rule, were printed in burnt orange; and the border was printed in two tones of process blue.

The border was designed by a pupil in the printing department and the two block cuts were cut in linoleum. The male die was cut and an imprint taken on another piece of linoleum.



CLEANING UP THE CASES

John Carnwright, Theodore Roosevelt Junior High School, Amsterdam, New York

The problem of cleaning pied cases is one that is continually confronting the printing instructor in the junior high school, especially if any production work has to be done.

The cleaning of these cases may be turned into an interesting job in which the spirit of competition may be made use of to good advantage.

To begin with, have one of the advanced students set up and print the following form:

PRINTING DEPARTMENT

Pupil's Name.....

Section.....

Time.....

This can be printed on scrap stock of differently colored paper, allotting a distinctive color to each one of the print-shop classes. Assign a case of type to each student of the first class and distribute to each a number of the slips and tell the boys to go to work at cleaning up the case. As each box is straightened he writes his name, section, and the time it took him to straighten the box on one of the slips and places it in that box with the type. He continues this procedure until the end of the period when a boy in the next class takes up the job where he left off.

It will not be long before the cases are in order again because the different pupils will vie with each other to show which one can clean up his case first.

A SOFT HAMMER

Dean Smith, Bakersfield, California

The soft hammer described herewith makes a very good machine-shop project, and at the same time a very handy tool for the student's tool kit. The head may be made of brass or any suitable soft material. The proportions for the handle as shown in the illustration, gives a very good grip and the right hang to the hammer. The leather washers may be cut out of old leather belting. The pieces may be cut square and compressed between the collars, after which they may be turned to the right diameter as shown.

THE NOVEMBER MEETING OF THE VOCATIONAL EDUCATION SOCIETY OF BOSTON

The Vocational Education Society of Boston held its monthly meeting on Saturday, November 9, in the Hotel Westminster. The meeting was attended by 58 members.

The program committee announced that, in view of the fact that the Massachusetts Tercentenary Exposition is being held this year, an effort would be made to offer programs for the season of a historical nature.

Mr. Joseph Sandberg, assistant director of manual arts of Boston, Mass., the speaker of the evening, discussed the subject, "Training of Teachers of the Manual Arts." In his talk, Mr. Sandberg pointed out that Finland was the first country to take up manual arts and was followed in 1872 by Sweden. During the Philadelphia Centennial in 1876, a great deal of

interest was aroused in this country through the exhibits of manual arts. Shortly after this, Mrs. Quincy Shaw became interested in the teaching of sloyd, and it was through her influence that Mr. Gustaf Larsen came to this country. The Russian method which originated in the University of Moscow, was modified for use in the grammar grades and became a rival of sloyd. At that time Mr. Benjamin Eddy was using the Russian method in the North Bennett Street School, and it was noted that a number of those present had taken courses under Mr. Eddy.

Mr. Sandberg pointed out that the need for the training of teachers of manual arts was felt and many academic teachers became interested. Classes were formed for Saturday mornings and evenings, the first class graduating in 1892. The first full-time course was begun in 1893, which was the beginning of the Sloyd School, and among its early graduates were Mr. Frank Leavitt, of Pittsburgh, Mr. Clark, of Boston, and Mr. King, of Bedford.

Later the question of a choice of systems came up in the Boston schools, and several experiments were tried, Mr. Leavitt sponsoring sloyd, and Mr. Eddy the Russian method. Finally sloyd was selected because it had proved practical and interesting to the students. A fine tribute was paid to the women teachers of the work in those early days. Although they were handicapped when compared with the men teachers in the use of tools, they made up for the deficiency through their skill in teaching. It was conceded that the women teachers of manual arts had contributed in no small measure to the success of the movement.

The talk was closed with a brief discussion during which the members were free to ask questions concerning the early history of the manual-arts movement. — *Louis A. Van Ham.*

NEW YORK SCHOOL CRAFTS CLUB MEETING

The November meeting of the School Crafts Club of New York City, was held on November 16 at the Geneva Hotel. An excellent group of speakers gave illustrated talks at the meeting. Mr. Charles R. Bostwick, Poppenhusen Institute, College Point, N. Y., spoke on "Reminiscence." Mr. E. F. Judd, Montclair, spoke on "Molding in the School Shop." Mr. Samuel G. Copper, Paterson, talked on "Metal Work in the High School." Mr. Philip M. Wagner, South Side High School, Newark, demonstrated how to get boys interested in "Model Airplanes." Mr. William G. Fielder, Union City and John Seeley, Rahway, brought along a number of material charts made upon by pupils and themselves to illustrate "Informational Material and Visual Aids in the Industrial-Arts Shop." Mr. Kenneth McCullock, Plainfield, had for his discussion the topic, "Mechanical Drawing in the Lower Grades."

The result of the election of officers for 1930, was as follows: President, Lloyd F. Stair, Madison, N. J.; vice-president, L. Omer Asher, Livingston, N. J.; secretary, Samuel Tannenbaum, New York City; treasurer, David Petrie, Paterson; and financial secretary, C. Dudley Moore, Glen Ridge, N. J.

WISCONSIN EDUCATOR DIES

In the death of Wm. C. Sieker, Wisconsin, and especially its vocational education system, has sustained an immense loss. The deceased has been the principal of the Milwaukee Vocational School since its establishment 17 years ago. His death on December 1, at the age of 54, came as a shock to many because his health immediately prior to that time had been reasonably good, although he has been a sufferer from arterial sclerosis for several years.

Mr. Sieker was a graduate of the University of Wisconsin, where his superior work earned him the coveted Phi Beta

WM. C. SIEKER

Kappa key, besides his B.S. degree. He taught in his native city, Manitowoc, Wisconsin, as well as in Milwaukee. In Milwaukee he was teacher of physics, chemistry, and general science at the West Division High School. He also taught at the Milwaukee State Teachers College and later became superintendent and general manager of the old Milwaukee Medical and Dental College which afterwards was merged with the

1930 OFFICERS OF NEW YORK SCHOOL CRAFTS CLUB
Reading from left to right: Harry Fletcher, chairman of program committee; David Petrie, treasurer; Lloyd F. Stair, president; L. Omer Asher, vice-president; C. Dudley Moore, financial secretary; and Samuel Tannenbaum, secretary.

Marquette University. Marquette conferred on him the honorary M.A. degree.

When the Milwaukee Vocational School was established in 1912, he was made principal and has held that position ever since. The growth of that school is due in great measure to his conscientious work.

His death will be mourned by thousands, because in his official capacity he earned the love and respect of all with whom he came in contact.

His accomplishment as health officer at Shorewood, Wis., practically resulted in the eradication of contagious diseases from the schools, and the results which he achieved in this position were quoted widely in national and international publications.

WISCONSIN VOCATIONAL ASSOCIATION

At a meeting of the Wisconsin Vocational Association held in conjunction with the Wisconsin Teachers Association convention in Milwaukee on November 8, the following new officers were elected: President, H. G. Noyes, Appleton; secretary-treasurer, Jacob Spies, Sheboygan, Wisconsin.

The following were elected to the executive committee: Trades and industry, H. M. Brook, Eau Claire; rehabilitation, Charles Beardsley, Madison; coordination, W. F. Opperman, La Crosse; teacher training, C. A. Bowman, Menomonie; home economics, Elizabeth Fratt, Racine; commercial, Louise Stearn; and general subjects, L. H. Wochos, Green Bay.

THE EASTERN ARTS CONVENTION

The officers of the Eastern Arts Association are rapidly completing plans for the annual meeting of the Association to be held April 23–26, at Boston, Mass. The meetings will be held in the Hotel Statler.

The committee on exhibits announces that all available space has been sold for exhibits of commercial products.

WISCONSIN INDUSTRIAL ARTS ASSOCIATION

The Wisconsin Industrial Arts Association held its second annual meeting in conjunction with the Wisconsin Teachers Convention at Milwaukee, November 7, 8, and 9. Mr. Morris M. Proffiitt, specialist in industrial education, Washington, D. C., spoke on "Where Are We Heading?" Mr. E. S. Lamoreaux, Janesville, gave an interesting report on the work done by the committee on Curriculum. Mr. H. W. Schmidt, of the state department, gave an interesting report on the aims and objective of manual arts.

The officers of the association were reelected as follows: President, E. S. Lamoreaux, Janesville; vice-president, C. W. Byrnes, East High School, Green Bay; secretary-treasurer, H. W. Cameron, Senior High School, Appleton.

MICHIGAN SOCIETY ANNOUNCES CONVENTION DATES

The Michigan Society for Manual Arts and Industrial Education will hold its annual meeting April 24, 25, and 26. Mr. R. L. Cooley, of Milwaukee, has been obtained as one of the principal speakers.

THE A.V.A. CONVENTION

The fourth annual convention of the American Vocational Association, which was held at New Orleans on December 4, 5, 6, and 7, is now a matter of History.

Although the place of meeting was far off the beaten path, yet approximately 1,000 of those interested in industrial and vocational education made the pilgrimage to the Southland, there to study and discuss how they might improve their part of that great movement which is to better prepare the young, the adults, and the disabled for efficient participation in the industrial, commercial, and agricultural life of our nation.

It is significant to note that the leaders of the American Vocational Association have tried their utmost to acquaint all parts of the country with the grave importance attached to the type of education for which the Association stands. For this reason the convention has been held in cities holding strategic positions in the various parts of the country, and those interested in industrial and vocational education have cheerfully attended the conventions which to date have been held at Louisville, Los Angeles, Philadelphia, and New Orleans.

It speaks well for the membership of the Association, that in spite of the hardships involved in reaching these distant points, nevertheless, each one of the past four conventions has been a real success. Yet it is self-evident that a more centrally located meeting point would enable a much greater attendance of men vitally interested in industrial and vocational education. Milwaukee, as the choice for the next convention city, therefore presages a meeting of much greater magnitude because it is accessible to a much larger percentage of those who are engaged in this type of work.

The shifting around of the meeting to the various parts of the country, however, has had its advantage, because it has broadened the acceptance of the work to a marked degree.

With respect to the program at New Orleans, great praise is due to those who arranged it. The topics taken up at the various sectional meetings were uniformly good. Of course, the criticism may be made that the various sectional meetings are too often programmed at places that are far apart. Many of the directors and others who attended these conventions are interested in more than one of the subjects which are scheduled for a certain day. If the meetings in which these subjects are taken up, happen to be located in the same building, say the headquarters hotel, or some central building, it is quite possible to cover both meetings. If this is not the case, it is a hopeless task to make the desired contacts.

Then too, the matter of shifting meetings from the room shown on the program to some other place always leads to disappointments and loss of time. Of course, this rigid scheduling of events is quite a difficult task and is often beyond the control of those who have charge of the program.

Sectional Meetings

A perusal of the subjects taken up at the sectional meetings shows how carefully the program committees worked in order to cover their particular field. A marvelous wealth of material was disseminated by those chosen on the various programs. Especially helpful were those speeches in which the plans of the various states with respect to industrial and vocational education were brought out. One might even say that this was the outstanding service rendered by this convention.

The industrial-arts section meetings were especially well planned. A commendable feature was introduced in a number of meetings held by this section, inasmuch as the speakers had provided mimeographed copies of the outline of their speeches to be distributed to those in attendance. The discussions were spirited and very much worth while.

Other sectional meetings of interest to our readers were those on teacher training, vocational guidance, printing, painting and decorating, and plumbing.

To tell of all the good things that came up at the meetings of the sections which would be of especial interest to the readers of the INDUSTRIAL-ARTS MAGAZINE, would, of course, be impossible in the compass of a short report.

Vocational training naturally came in for a great share of attention, and both the industrial aspect as well as the school side of the question was discussed by men prominent in their own particular fields. Of especial interest in this field were the discussions in which the training of apprentices, and of workers for the lesser skilled occupations, were discussed. The preparation of instructional material for this type of instruction also was very capably discussed.

Friday Meetings

On Friday afternoon there was the usual "Ship" program. This is an annual event put on by the exhibitors whose presence at the conventions does much to make the visit of the teachers worth while.

The annual banquet was held on Friday evening. President R. L. Cooley presided, and the main address was delivered

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Vocational Class Builds Sidewalks

The vocational class at Olney, Tex., under the direction of Mr. J. G. Bishop, has laid new concrete sidewalks around the North Ward School. The pupils did all the work in connection with the construction of the sidewalks, including the laying of the forms and the pouring of the concrete.

ASSOCIATION NOTES

(Continued from Page 44)

by E. W. Sikes, president of Clemson College, South Carolina. The usual state songs and state yells helped to enliven the evening.

At the house-of-delegates meeting, the following were elected to conduct the affairs of the association next year.

President, Paul W. Chapman, state director of vocational education, Georgia; treasurer, Charles W. Sylvester, director, vocational education, Baltimore, Md.; vice-president for home economics for three years, Miss Beulah I. Coon, Chicago University; vice-president for commercial education for three years, Miss Regina Groves, Madison, Wis.

THE WABASH VALLEY (INDIANA) INDUSTRIAL EDUCATION CLUB HOLDS MEETING

The teachers of industrial education in Vigo county, Indiana, have formed a club for mutual benefit in studying and hearing reports on current development in the field of industrial education. Four meetings were held during the school year 1928–29, which stressed professional problems primarily. The present year's program included meetings held for discussion purposes, and plans are under way to change the meetings to include a dinner hour prior to the time devoted to professional discussion.

The November meeting included a short business session, at which Mr. Ketron, of Terre Haute, was elected vice-president of the club. A decision was made to change the meetings to dinner meetings and to abandon the professional meeting.

Following the business session, Mr. Eaton, of Terre Haute, presented an outline of an idea for teaching architectural drafting and methods. Stress was laid upon such topics as the selection of a building site, methods of financing the building of a home, types of architecture as they relate to home building, and the drawing of plans and elevations for a home.

The program committee is at work upon an especially fine program for the year. It is planned to have Dr. W. T. Bawden as one of the principal speakers.—*H. A. Huntington.*

THE IOWA ASSOCIATION OF MANUAL-TRAINING-TEACHERS HOLDS MEETING

The Iowa Association of Manual Training and Industrial-Arts Teachers held its annual meeting on November 7 and 8, in connection with the regular state teachers' convention. Mr. R. H. Barnes presided as chairman of the meeting. The meeting was attended by 75 teachers of the industrial arts.

Mr. H. W. Carmichael, in his talk, presented to the group various problems which he asked the association to work out.

On Friday, the association held a luncheon in the chamber of commerce dining room, at which Professor Adolph Shane was toastmaster. Dr. W. A. Brandenberg, president of the Kansas Teachers' College, gave an interesting talk on the subject, "The Industrial Arts of Today." Mr. A. L. Urick and Dr. C. E. Fulmer also gave short talks.

At the regular business meeting reports were received from the several committees. A report on the state course of study was made by Mr. A. P. Twogood, of Newton. Mr. E. S. Baird, of the Iowa State College, gave a report for the publicity committee. Prof. Adolph Shane, of the teachers' qualification committee, made a report showing graphically the educational requirements of industrial-arts teachers in each of the 48 states. The meeting was brought to a close with an address by Dr. C. E. Fulmer on the subject of "Vocational Guidance."

The election of officers for the year resulted as follows:

President, Mr. W. L. Hunter, Ames; vice-president, Mr. W. C. Wood, Davenport; secretary, H. W. Carmichael, Des Moines; treasurer, Mr. W. S. Morgenthaler; trustee, Mr. R. H. Barnes. — *William L. Hunter.*